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1901

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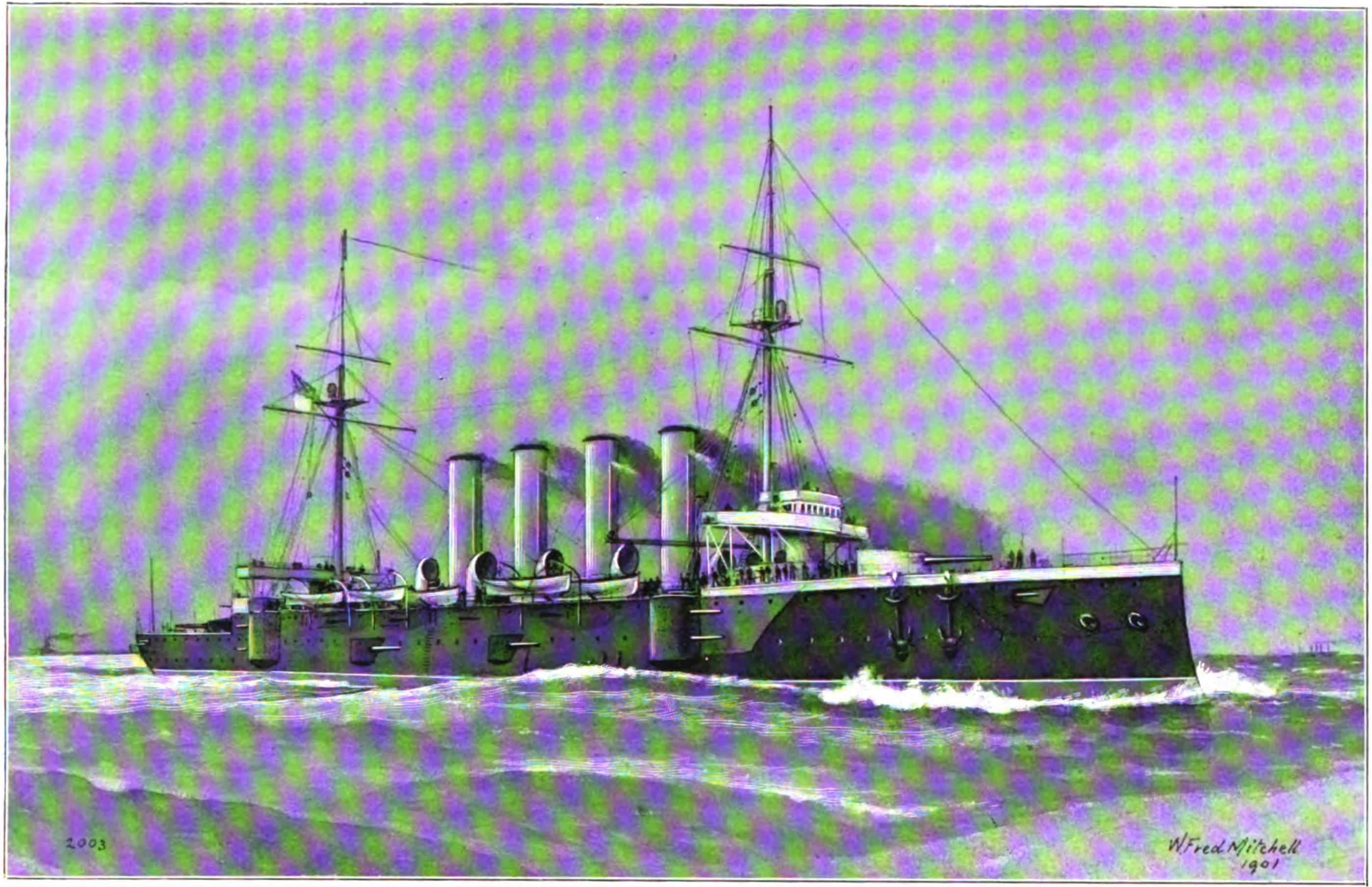

H.M.S. "CRESSY."

FIRST-CLASS ARMOURED CRUISER.

NAVAL [illegible]

19[illegible].

[illegible]

PART I.—[illegible]
C. N. [illegible], R.N. [illegible]
G. R. [illegible] and [illegible]

PART II.—List of Ships [illegible]

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THE

NAVAL ANNUAL,

1901.

EDITED BY

JOHN LEYLAND.

PART I.—Lord BRASSEY; Admiral Sir J. O. HOPKINS, G.C.B.; Vice-Admiral Sir CYPRIAN A. G. BRIDGE, K.C.B.; Captain R. H. S. BACON, R.N., D.S.O.; Commander C. N. ROBINSON, R.N.; Messrs. J. R. THURSFIELD, G. R. DUNELL, and A. S. HURD; and the EDITOR.

PART II.—Lists of Ships: Commander C. N. ROBINSON, R.N., and the EDITOR; Plates: S. W. BARNABY, M.I.N.A.

PART III.—Armour; Belleisle Experiments; Ordnance and Ordnance Tables.

PART IV.—FIRST LORD'S MEMORANDUM; NAVY ESTIMATES, BRITISH AND FOREIGN.

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PREFACE.

THE *Naval Annual* of 1901 appears as the record of a very important year in the history of the British Empire, and at a period of significance also in the opening of a new century. For the second time the honour of editing its pages has fallen to me, for engrossment in political concerns has precluded the Hon. T. A. Brassey from taking his accustomed part in the preparation of the volume. I could place before myself no better object than to invest the work with the character of completeness and accuracy which have given it worldwide authority.

I have been fortunate in receiving the ready help of many writers, who have contributed to these pages, and to Lord Brassey himself, the founder of the *Annual*, a very great deal is due. Returning from his responsible duties as Governor of Victoria, his lordship has been able, after an interval of six years, to contribute to the *Annual* a general survey of the naval situation, as well as an important discussion on the subject of Manning, to which he has devoted life-long attention. What may be described as the "permanent" features of the *Annual* retain their familiar form. Commander C. N. Robinson, R.N., describes the progress of the British Navy, while the chapters devoted to foreign navies and comparative strength have been in my hands. Mr. Thursfield again contributes a critical estimate of the naval manœuvres, while Mr. Dunell reviews the progress of naval engineering, and deals with the interim report of the Admiralty Boiler Committee and the weighty questions to which it has given rise. An important chapter, which may be said to belong to the same category, since it deals with the development of the navy, is Admiral Sir John Hopkins's conclusive plea for auxiliary ships.

The great importance of the war in South Africa has led to the inclusion of two chapters of current interest. In one I have endeavoured to present a picture of the vast work of transporting the forces over sea. It has been my aim to describe the conditions and estimate the success, and in doing so I have been able to vindicate the Admiralty from certain charges made against it in the early part of the war. A record of the operations of the naval forces ashore was essential in this volume, and it is from the experienced pen of Commander Robinson, who has included an account of the work of the naval forces in China.

A chapter of the highest value, being reflections at the opening of the new century, is from the pen of Vice-Admiral Sir Cyprian

Bridge. It is a warning that should be taken to heart by all who recognise—and all Englishmen should recognise—the importance of efficiency to the Navy: a warning against the spirit of formalism and professional self-sufficiency, which becomes as a fetter to check individuality, and has led to many a sharp disillusionment in the history of nations. A chapter to be linked with this is that of Captain Bacon on Naval Strategy, which presents some very far-reaching considerations.

A contributor new to the *Annual* is Mr. A. S. Hurd, who reviews the naval construction of the past five years, explains the delays that have occurred, and presents the view of those who are disposed to lay the blame upon the Admiralty.

The tables of British and foreign ships have been brought up to date, as have also the diagrams. Owing to the absence abroad last year of Mr. S. W. Barnaby, Mr. F. K. Barnes, that old and valued contributor to the *Annual*, consented to supervise the preparation of the diagrams in the volume for 1900; but now Mr. Barnaby has resumed the work and added much that is new, and it will be found that sketches of many of the latest British and foreign ships are included. A section of the new American submarine boats is among the additions.

The death of Captain Orde Browne was a serious loss to the *Naval Annual*. That well-known authority, with impartial judgment and ripe experience that were rare, had written the section on armour and ordnance for many years, with a competence and discrimination that gave to Part III. very exceptional value. To find a successor was no easy task, and, after mature deliberation, it was decided that in the new volume the chapters should, appropriately, assume the form of a review and estimate of recent progress, from which sound lessons might be drawn. The present editor claims no credit for what appears in this section of the work. He has passed it for press with a full recognition of its great value, and believes the readers of the *Annual* will recognise that its author possesses a profound knowledge of his subject—the fruit of long and intimate acquaintance with it—and a penetrating judgment which have enabled him to seize the significance of recent changes in the production of armour and ordnance. In the chapter on armour will, indeed, be found some considerations which are of great importance. Finally, it is a pleasure to acknowledge help that has been received from many competent authorities.

Forest Hill, JOHN LEYLAND.
April, 1901.

CONTENTS.

PART I.

PART II.

TABLES OF BRITISH AND FOREIGN SHIPS.

TORPEDO-BOAT TABLES.

Commander C. N. ROBINSON, R.N., and JOHN LEYLAND.

PLANS OF BRITISH AND FOREIGN SHIPS.

S. W. BARNABY, M.I.N.A.

PART III.

PART IV.

LIST OF ILLUSTRATIONS.

DIAGRAM.

PART I.

CHAPTER I.

INTRODUCTORY.

I.

As the founder of the *Naval Annual* I must always take an interest in its production. During my absence in Australia I ceased to be a contributor, and in taking up the pen after a long interval, I may appropriately refer to the enormous advance in Naval Expenditure under all the leading Administrations. In round figures France is spending £13,500,000 upon her Navy; Russia, £9,000,000. The Navy Estimates now before the British Parliament in this present Session provide a net total of £30,875,500, being an increase of £2,083,600 beyond the amount voted for the year 1900-01. The Estimates with which we are now dealing show an increase of nearly £12,000,000 upon those of the year 1894-95.

The justification for the policy we have followed was well put in the following passage:—"The Fleet is England's right arm. But for her Fleet England would be a cypher in the Councils of Europe, might be denuded of her Colonies, and could not hold the Indian Empire a year. But for the Fleet the English working man might any day find his daily occupation gone, and the price of his children's bread risen to half-a-crown a loaf. The greater the Fleet, and the wider the area of its operation, the more effective this mighty right arm of the nation must become. Every shilling that is devoted to it, if expended with economy and judgment, is well bestowed, for it is England's insurance against those great accidental calamities which destroy the happiness and prosperity, and sometimes the lives, of nations." In a recent number the *Spectator* has truly said: "On the Navy hang our Empire and our commercial prosperity. Our island position made it needful to begin with, and our scattered Colonies increase the necessity. It is the one fighting arm in which by the nature of things we have the chance of surpassing all other peoples. It is the form of war most suited to the genius of our race, and bound up with the most stirring traditions of our history. Bare tables of statistics may help to prove its importance, but the reasons at the back of them all must be plain to every man in the nation." Naval policy.

The Fleet is not only necessary for defence; it is the surest guarantee for the maintenance of peace. In his memorandum on the well-known paper drawn up by the Duke of Wellington in 1847 Lord John Russell wrote as follows:—"France is the country nearest to us as a neighbour, most formidable as a rival, and with whom we have at once the most frequent opportunities of friendly concert and the greatest probability of irreconcileable quarrel. . . . If both are prepared both will be unwilling to rush into war at the hazard of severe and instant retaliation, or at least of successful repulse. But if one is prepared and the other is not, the State which is prepared becomes eager to take advantage of its superiority."

French official views.

The Report of the Committee of the French Chamber of Deputies on the Navy Estimates for the year 1901 is opened by M. Fleury-Ravarin with some observations on Naval Policy: "Every nation desirous to play a part in the world must possess the means of using an adequate force in support of its policy. A Navy cannot be improvised; a policy must be consistently pursued. Modern France has inherited a position among the family of nations which was long commanding, and is still of no mean importance. It is the bounden duty of all who have faith in their country to sustain that position, and, as far as possible, to strengthen it. It cannot be abandoned without loss of self-esteem, nor without taking from every citizen that confidence without which enterprises in distant lands cannot be undertaken.

"In all the campaigns of the last seventy years the naval forces have materially influenced, and have often decided, the result. The conquest of Algiers, the Crimean War, the war in Italy, would have been impossible without the support of the French Navy. Naval forces played a great part in the Civil War in America, in the struggle between Chili and Peru, in the war between Russia and Turkey, and between Italy and Austria, and, more recently, the Spanish-American War. The difficult questions connected with the opening up of China will not be decided on the Continent of Europe, but upon the sea, and probably in the Far East on the Pacific Ocean.

"Naval power is an essential instrument in diplomacy. The standard of strength at which our Fleet should be maintained must depend on the line it is proposed to follow in relation to foreign affairs. If our policy is expansion, whether colonial or simply commercial, we must have an adequate Navy to support it. Without such a Navy we must abandon the field to other nations. It has been often contended that France cannot maintain a strong Navy as well as a powerful Army. The truth is that the Navy, so far from

imposing a heavy charge on the country, is the main source of wealth through the protection it affords to commerce. Without the Navy created by Colbert, Louis XIV. would have been unable to undertake the Continental wars in which he was engaged. The neglect of the Navy was quickly followed by reverses on land."

Standard of strength.

Accepting as our standard equality to any two Powers, British expenditure cannot be considered inadequate. There are some who insist that our Fleet should be superior to a combination of France, Russia, and Germany. The maintenance of such a force would impose a heavy burden. It cannot be necessary while prudent counsels prevail in the direction of the policy of the Empire.

II.

Manning of the Fleet.

If we turn from the expenditure to the manning of the Fleet, the Estimates for 1901–2 provide for an increase of 3745 men, including 287 officers, 1150 seamen, 1000 marines, 500 stokers, and 100 electricians. Our permanent force for the year 1901–2 will aggregate 119,000 men, as against 43,000 for France and 45,000 for Russia.

The Fleet Reserve should be a valuable addition to our strength. The reserves which we should endeavour to create in the Mercantile Marine are not as strong or as efficient as we should wish. The numbers voted for the British Reserve are 23,000, as against 114,000 in the French Inscription Maritime. The Fisheries and the Mercantile Marine of France supply annually some 4000 men for deck duties. For the engine-room complements it is necessary to have recourse to voluntary enlistment, some 3000 men being annually entered and specially trained.

A volunteer reserve.

For the manning of the British Navy we are relying unduly on a permanent force. It is an extravagant method. It must be difficult to give sufficient sea time to the growing numbers. A permanent force not supported by Reserves cannot adequately supply the means of reinforcement in time of war. As a reserve, standing behind the permanent force of marines and marine artillery, a volunteer force, recruited from the classes which were enrolled in the Royal Naval Artillery Volunteers, disbanded by the Admiralty over which Lord George Hamilton presided, seems desirable. An original error was committed in treating the Royal Naval Artillery Volunteers as a bluejacket force; they had no claim to that character, although a considerable number were well acquainted with a sea life. The Royal Naval Artillery Volunteers were well fitted to act as marines. They were highly intelligent in picking up their gun drill, they were able to pull a strong oar, they could have been instructed in signalling, and might have been most useful in association with a few old seamen

in relieving the coastguard in time of war. As seamen, it was impossible to assign to the Royal Naval Artillery Volunteers any definite place or sphere of action in a scheme of naval defence; as a reserve of marines the difficulties would have disappeared.

III.

Ships.

Passing from the men to the ships, it is unnecessary in this place to deal at length with the strength and distribution of the Fleet. In the following chapter Commander C. N. Robinson has described the progress made since the *Annual* last appeared; while in another chapter Mr. John Leyland estimates the comparative strength, indicates the naval strength on the foreign stations, and has brought up to date the comparative lists of ships of the Powers.

While our strength is fully up to the standard of equality to any two Powers, a deduction must be made in the case of a fleet which will be expected to act on the offensive. Blockade, under modern conditions, must be an arduous service. Steam has made it possible to put to sea in all weathers. There are risks of attack by torpedo vessels such as were unknown in the days of Nelson. The crews of ships keeping watch and ward outside an enemy's port soon become exhausted. Bunkers are rapidly emptied.

In cruisers we have a decided numerical superiority. For the protection of our vast commerce it is desirable to make further provision by auxiliary vessels. Such a policy will render it possible to concentrate our efforts upon those powerful fighting ships which it is impossible to obtain from the Mercantile Marine. In future Estimates the appropriation for battleships should be increased, looking to the mercantile auxiliaries as the scouting ships of our squadrons and the defenders of our commerce.

In regard to ships in commission, it may be said that we maintain considerable squadrons on every station. The main strength of the Russian Navy is concentrated in the Far East, that of France in the Mediterranean. On both stations we are well able to hold our own.

IV.

Naval training.

In the past year the training of the Navy has been the subject of frequent discussion. Dealing first with the officers, a naval friend, at the date of writing on half-pay, but now Commander-in-Chief on a foreign station, writes as follows: "I wish that the training of the officers and men were such as it should be. The age of entry

Officers.

for officers was raised that they might enter with a fair grounding in knowledge, and with a reasonable hope that they would continue to

instruct themselves, but no sooner do they arrive at an age when every faculty should be employed in acquiring practical knowledge than they are carried off to the College at Greenwich for a most protracted course which is of little use in a practical profession, and which is dropped from the day they leave the College.

"Before the Greenwich course was introduced there were always a select few who took up special branches for themselves. In the present day the young officer on entry is driven from pillar to post, from one subject to another. When he has got through what is called his seamanship examination, he is sent off to college to be run through a groove of the higher mathematics, the use of which is rarely seen in his after life. In the meantime practical work afloat is an unknown quantity."

A knowledge of trigonometry is essential in the study of the theory, but not in the practice, of navigation. Few indeed are the masters and mates of the Mercantile Marine in whom any competent knowledge of mathematics would be found. On the other hand, ignorance of a foreign language, and more particularly of French, is a most serious deficiency in a naval officer, who may at any time be called upon to deal with a difficulty abroad. The expectation that all junior officers of the Navy will acquire a colloquial knowledge of French will be vain unless adequate facilities and encouragements are given. In the home ports and at important stations abroad, such as Malta and Sydney, instruction should be given to naval officers by teachers specially qualified. The study of languages should be encouraged by the Admiralty, by giving more prizes for proficiency in the subject. In the examination for the rank of lieutenant, French counts for not more than 150 marks out of a total possible number of 2000. Every naval officer should be a good seaman and a competent navigator. It would be for the advantage of the Service to accept, in a certain number, a lower standard of mathematical knowledge in order to secure higher attainments as linguists.

The training of seamen was the theme of an animated debate initiated last summer in the theatre of the United Service Institution by Mr. Thursfield, who was able to tell his audience that he had seen more of the naval service afloat during the past twelve years than any civilian had ever seen before. His claim to be heard was fully recognised by naval men. Opening with an observation which affords subject for reflection, Mr. Thursfield said: "The country has created a new Navy of unexampled strength and excellence in *matériel*; for its *personnel*, on the other hand, it has given no commensurate training." Among many speakers it is difficult to make a selection. Sir Edmund Commerell believed that "masts and Seamen.

sails were not done with," that "it would be much to the detriment of our men as practical sailors if that were so; when the country understood that the training of men in sailing-ships was the only way to make good seamen, we might be sure there would be no difficulty as to expenditure." Sir Frederick Richards "hoped that it was not true that masts and sails were doomed. If they did away with the training they afforded what did their opponents propose to substitute for it? This training taught the boys the qualities of nerve and courage which were so necessary. To train the men who were now coming forward no very great increase in the Training Squadron would be required—eight ships would be sufficient. He hoped that those entrusted with the administration of the Navy would pause and consider before they incurred the grave responsibility of making a change which might have very far-reaching and momentous consequences." Sir Anthony Hoskins, the predecessor of Sir Frederick Richards in his high post at the Admiralty, expressed his full concurrence: he warmly advocated a sailing squadron. Nor should the opinion of the younger officers be put out of view. Commander Lowthian Nicholson "entirely disagreed with the idea that the day of masts and sails had gone; he believed that training in a sailing-ship gave seamen self-reliance and resource, quickness of eye, steadiness of nerve, coolness in all difficulties, and a sense of comradeship, all going to keep up the efficiency of the British seaman." Commander Napier held "that the seaman who had undergone mast and sail training was undoubtedly a superior man to one who had not."

The discussion was continued in the *Times*. Sir Cyprian Bridge, in a practical and instructive letter, referred to an inquiry instituted a few years ago into the physical characteristics of the ships' companies of a squadron comprising ships with sails and ships without sails. The inquiry showed that the able seamen and petty officers of ships with sails surpassed in every particular of weight and physical power their equals in rating serving in the sailless ships. He urged the difficulty of finding a substitute for the work aloft.

The balance of argument and authority in the recent discussion seems to lie with the advocates of masted training ships. A squadron of eight ships of the C class, or of a class specially designed for the service, should be kept in commission, cruising singly and in squadrons. There is no better cruising ground in the winter than the south coast of Spain.

In addition to the re-establishment of the Training Squadron, sailing tenders should be attached to all our port-guard ships and reserve ships in home waters. Sea habits, pilotage, the rule of the

road and experience of bad weather, may be perhaps best acquired in small vessels.

The growth of establishments on shore requires most careful watching on the part of the Admiralty. If the men who take our ships to sea are far in advance of the men of any possible enemy, it is because the ship of the British Navy is more at sea than that of any foreign power. The sea is the only place where the seaman can learn the duties of his trying and arduous profession.

The tendency to diminish the sea-training of officers and men may prove very prejudicial to efficiency of the Navy. A correspondent of the *Times*, under the assumed name of "Navalis," has recently shown that the proportion of lieutenants serving in harbour and ashore has increased from 4 per cent. in 1880 to 9 per cent. in 1900. In the case of sub-lieutenants, the numbers in harbour and ashore have increased from 27 per cent. to no less than 41 per cent. The training in gunnery in the Navy seems worthy of our great national Service: the standard of proficiency is steadily advancing. Let us not lose the seamanship for which our Navy has long been famous.

The training in the torpedo flotilla lately introduced by the Admiralty cannot fail to give excellent results.

V.

Battleships.

The necessity of battleships as the main instruments for maintaining command of the seas shall not be insisted upon here. The modern battleship is greatly superior in sea-keeping qualities to the earlier types, in which the preponderating value was given to smallness of target. In smooth water a low freeboard is an obvious advantage. In a seaway the want of freeboard involves loss of speed and inability to fight the guns. The recent ships designed by Sir William White have ample freeboard, and carry their guns at a commanding elevation above the water. The advance in speed in modern ships is a notable feature.

The gain in sea-worthiness, speed, and coal endurance has rendered necessary a rapid growth in dimensions. In the list of British battleships we have the Royal Sovereign class of 14,150 tons, Majestic class of 14,900 tons, Canopus class of 12,950 tons, eight Formidable class of 15,000 tons, and six Duncan class of 14,000 tons. In former years the present writer bestowed much labour in collating arguments for restricting dimensions, with a view to a proportionate increase of numbers. The conditions have changed. At the present time our British ships of 15,000 tons cost less than French and Russian ships of far inferior dimensions. It

may confidently be claimed that the requirements, often conflicting, of a perfect man-of-war are skilfully combined in the designs produced at the Admiralty. The able men on whom the responsibility rests of directing the naval construction of the leading maritime Powers are intimately acquainted with professional work elsewhere. In point of ability the presumption is that they do not differ widely. Ton for ton in ships of even date there is no appreciable difference between the fighting vessels of the Russian, the German, the Italian, the United States, the French, or our own Navies. It is a reasonable presumption that the biggest ships are the best, and ours are the biggest.

Criticisms of British battleships are seldom heard. It does not require the technical knowledge of an expert to appreciate that our ships, more especially those of the later designs, are truly noble types. In ability to hold the sea they are immeasurably superior to the low freeboard ships, of which the Devastation and the Thunderer were characteristic examples. The Monitor was a perfect type for inshore warfare, or for the bombardment of fortresses from a sheltered channel or anchorage. The designer of ships for the British service must produce a type capable of keeping the sea and carrying the national flag to the furthest limits of the world. The British Navy has a decided advantage in possessing groups of ships of uniform type.

The French are steadily increasing the dimensions of their battleships: the new Suffren type will have a displacement of 14,865 tons. In the French Navy it is now recognised that too much importance has been attached to the armoured belt.

The recent construction for the United States has been exhaustively described in a valuable paper read by Professor Biles at the recent session of the Institute of Naval Architects. It deals fully with the productions of constructors who belong to a country supreme in ingenuity, and acting under a body of naval officers who have had the latest experience in the actual operations of war. In the recent designs for battleships in the United States more importance is assigned to superiority of armament than to an extra knot of speed. In the new battleships it has been possible to add eight 8-inch guns to the armament by the adoption of the super-imposed turrets. The American constructors object to the system: it finds favour with the Ordnance Department and the naval officers. The United States naval authorities have gone up to dimensions of 15,000 tons for their most recent designs.

VI.

Machinery will be dealt with in a special chapter by a competent hand. The sudden introduction on a vast scale into the British Navy of water-tube boilers rendered it necessary to put them into the charge of engine-room complements with no experience of their use. Many accidents and breakdowns having occurred, an inquiry was ordered by Lord Goschen, and a preliminary report of the committee has been laid before Parliament. The Committee do not consider the Belleville boiler to be the best type, and recommend the trial of four types of large straight-tube boilers now being extensively adopted in foreign navies. The water-tube boiler was adopted in deference to arguments of great force. No country could afford to relinquish a decided advantage in speed for a given weight or the greater advantage of getting up steam and increasing speed rapidly, unless there were strong grounds for supposing that the defects in details which now render the machinery less reliable than the older and well-tried types were likely to be permanent. All foreign navies have adopted water-tube boilers. **Machinery and engine room *personnel*.**

The training of our engine-room complements has become a question of urgency. While every bluejacket spends two years in a training-ship, is exercised in brigs, and has until lately served in the sea-going Training Squadron, there is no corresponding provision for the training of stokers and artificers. As the result of the insufficient training, it has been alleged that one-third of the engine-room branch are inefficient during the first year or more of every commission, and that for the first two years no ship is possessed of a fully trained engine-room staff. It is pointed out that the difficulty is accentuated by the insufficiency in the number of engineer officers. When ships are under steam the engineers are too fully occupied with urgent duties to be able to bestow attention on untrained men. It would seem necessary to employ ships for the special training of the engine-room complements, and the Powerful and the Terrible might be suitable for this purpose. They should make frequent passages between the home ports and Gibraltar.

In the introduction of the Belleville boiler we made too great a rush. In principle we were right, but we had not, and we cannot for some time provide, a fully trained *personnel* for the engine-room complements. In this respect foreign navies, and notably the Italian and the Japanese, seem to have done better than ourselves in the avoidance of mistakes of management. Our experience of failure with the Belleville boiler seems to point with emphatic force to the necessity for more careful training of our engine-room complements.

VII.

Cruisers.

Passing from the types of battleships to the cruisers, the effect of the laying down of the Russian ship Rurik was quickly seen in the construction of our Powerful and Terrible. These ships were unprecedented in their dimensions. They have been followed by the eight ships of the Diadem class of 11,000 tons, the six ships of the Cressy class of 12,000 tons, the four ships of the Drake class of 14,100 tons, and the ten ships of the County class of 9800 tons. High speeds, under ocean-going conditions and large coal endurance, have rendered the advance in dimensions inevitable. The cruisers recently constructed for the British Navy have been sometimes criticised as being inferior in speed or armament. There are other essential details as to which a limited comparison gives no information. Tables supply no particulars as to structural strength or freeboard, both being features essential to seaworthiness. When the radius of action can be restricted, the coal supply, the stores, and even the ammunition may be cut down and the disposable weight applied to the increase of armour protection or of armament.

Several armoured cruisers of the largest dimensions are being constructed for the French Navy. The French have always been famed for the production of models admirably adapted for speed. In their latest ships they have well sustained their ancient fame. As with us, so in the French Navy, tubular boilers have presented difficulties.

In the Russian Navy three first-class vessels have recently been laid down with a displacement of 13,600 tons. Six protected cruisers of 6500 tons are also in hand. In vessels of comparatively restricted dimensions the coal supply is too limited for ocean cruising.

In the United States the construction of first-class cruisers has been commenced with vigour. The list of ships building or ordered includes six vessels approximately 13,700 tons, and three others of 9700 tons, which will be up to the highest standard of fighting efficiency. Defects which were criticised by some American authorities in designs of earlier date and inferior dimensions will no longer appear.

VIII.

Reconstruction of ships.

Expenditure on re-armaments, and on the fitting of new machinery to the older types of battleships, is not viewed with favour by constructors, to whom it must always be a more grateful task to build from designs of their own rather than to modernise ships which are becoming obsolete. Within prudent limits, no expenditure would yield more immediate results in reinforcing the Navy than that

incurred in fitting the sound and not badly protected hulls of the earlier ironclads with effective engines and guns. In war with a first-class Power the sphere of action of our converted ships would be found in distant waters, in the capture of coaling stations, and in defending our trade with the East by convoy and patrol.

As a member of Lord Northbrook's Administration the present writer naturally looks to the ships of that period. The "Admiral" class are too low in the bows; the central batteries are unarmoured. By suppressing the forward turret, and the two heavy guns which it contains, a large disposable weight could be utilised in raising the bow, and in giving protection to the battery. The armament forward might consist of powerful quick-firing guns protected by armour. The disposition might be similar to that adopted for the latest types of first-class armoured cruisers. Such ships as those of the "Admiral" class, with the improvements which might be made, would be a good match for many ships which will long be retained on the effective lists of foreign Powers. Reinforced by fast cruisers for services demanding extreme speed they would form efficient squadrons for the protection of the lines of communication by the Cape route to India and the Far East.

The belted cruisers of the same period might be brought up to such a standard of fighting efficiency as would keep them on the list of effectives for many years. The belted cruisers are powerfully armed and engined. The ocean speeds at sea fall short of the results which would certainly be obtained with more length and more free-board forward. They should be lengthened amidships.

Lieutenant Dawson, R.N., in the able paper recently read at the Society of Arts, recommends that ships of a still older date than those laid down by Lord Northbrook should be taken in hand. He compares the fighting power of the Inflexible, armed with her muzzle-loading guns, with those of a French cruiser of the Cassard class armed with breechloaders. The following paragraph may be quoted:—

"At a range of 8000 yards, or beyond, the French ship would be in safety against the fire of the Inflexible's guns, whereas at this range the French cruiser, with the aid of her modern guns and of modern telescopic sights, would be able to make good practice against the British ship, and, in my opinion, would put her quickly out of action by firing large capacity high explosive and other modern shells. Let us, from this particular illustration, consider further the cost to the country. Each man employed on board ship costs us about £100 per annum, and thus the wages bill for 485 men is at the rate of £48,500 per annum. The up-keep during war of a ship of the Inflexible class in the expenditure of coal alone, since it would be at famine prices, would be enormous, and the cost of repairs, etc., greatly disproportionate to the services rendered. But apart from these monetary items there is the far more important question of the ineffective employment of the 485 men, whose training represents a large national asset. And, what would be still more deplorable from more views than one, if these obsolete ships, of which there are very many in the Service, are sunk or taken, a very large and very unpleasant gap would be made in our *personnel*. Other

similar illustrations might be given, but this one surely affords strong reason for either selling the old obsolete ships and expending no more money on them even in peace times or for arming them with modern artillery. The latter course seems to me more advisable, as armaments of a kind can be provided much more quickly than new ships to replace the old vessels, and history has shown the value of reserve ships to fill up gaps in naval warfare, even if they be not quite up to the mark from a ship construction point of view. The nation which can more expeditiously challenge the enemy anew after a hard-fought battle is the more likely to succeed ultimately."

The French Administration has decided to cut down the heavy superstructures with which their ships have been encumbered, and at the same time to modernise the machinery and to arm the ships with guns of the most recent pattern, of smallar calibre, and lighter in weight, but with a more commanding range. As the result of an exhaustive examination of the subject, schemes were approved in 1896 for the reconstruction of certain coast-defence vessels, and in 1897 for a similar reconstruction of certain battleships. In all, fifteen ships have been, or will be, taken in hand. The list includes ten battleships, namely, Formidable, Amiral Baudin, Courbet, Redoutable, Dévastation, Hoche, Amiral Duperré, Marceau, Neptune, and Magenta, and five coast-defenders—Terrible, Caïman, Indomptable, Requin, and Furieux. The total expenditure authorised is, in round figures, one million sterling.

IX.

Torpedo craft.

The torpedo flotilla is becoming a most important feature in the navies of the Continental Powers. The types produced by the Schichau firm are now largely represented in the Russian, German and Italian navies. Their displacements range from 350 tons upwards; they carry ninety-five tons of coal; speed, 26 knots and upwards; armament, three or more 2-inch guns and three torpedo-tubes. Their sea-keeping powers are of a superior order. The passage is made without difficulty to the Farthest East even during the height of the monsoon. Some sixteen torpedo-boat destroyers exceeding 400 tons displacement are being constructed for the United States Navy.

The efficiency of submarine boats is limited to the defence of harbours. The French and Americans are building several vessels for that purpose. We are following them in this new type.

X.

Mercantile auxiliaries

Fewer cruisers will be required, specially built for fighting purposes, if we make our mercantile auxiliaries more effective. A lecture of much interest has recently been delivered at Liverpool by Mr. Peskett, of the Cunard Company. The writer is a strong

advocate for subsidies to mercantile auxiliaries, conditional upon the adaptation of the ships to the requirement of naval warfare. The paragraphs which follow are quoted from a *précis* of his lecture:—

Merchant ships of the Campania or Saxonia class could actually be built lighter than they are under the present system if they were built with one very strong deck, such as a protective deck with sloping sides, or with a deck of cellular form. The disposition of material in some of our large steamers is not perhaps in strict accordance with the best designs our naval architects could produce, but entirely due to the requirements of owners and the various registration societies. I should say that a cruiser's hull with protective deck is lighter in proportion to her displacement than that of many of our first-class passenger steamers.

Taking into consideration the fact that our supremacy depends on the efficiency of our naval and mercantile marine, a committee of Admiralty officials, shipowners and shipbuilders should be formed to discuss the best method of constructing a combined naval and mercantile marine, and to consider whether ships could be built as merchant cruisers, with protective decks, ram stems, machinery and steering gear below the waterline, and still be able to carry enough passengers and mails which with a reasonable subsidy would make the ships remunerative to owners.

These ships would have to be permanently mounted with light guns, racer-plates for heavier armaments being built in the ships during construction, the heavier guns and mountings being kept at ports of call, and made to suit the various ships of any particular fleet.

The policy recommended by Mr. Peskett was many years ago strongly advocated by Sir Nathaniel Barnaby. It has been consistently supported in the *Naval Annual.* If we turn to foreign writers, Admiral Fournier in *La Flotte Nécessaire* gives his opinion as follows: "As types of fast cruisers for the destruction of commerce, I know of nothing which more fully meets the requirements than those magnificent trans-Atlantic steamships, the Lucania and Campania, capable of maintaining a speed of 22 knots an hour with extraordinary uniformity. The New York, Paris, St. Louis, and St. Paul, and the English ships Majestic and Teutonic, possess the same qualities, though in a somewhat lesser degree of perfection. Such ships will, in my view, be the destroyers of commerce in the future."

XI.

Retarded construction.

The delays in the completion of ships call for some observations. In five years the expenditure has been four and a half millions below the sum voted by Parliament. We are assured by the First Lord that the difficulties in the manufacture of armour, which have been the main cause of delay, have been overcome. The most serious delays having occurred in the case of dockyard built ships, it would seem desirable to put out construction to contract more largely. It is much to be regretted that firms which have been extensively employed have been involved in financial difficulties as the result, presumably, of excessive competition for Admiralty work. Undue cutting of rates cannot be for the public advantage if it leads to the closing of great establishments on which we have relied for the maintenance and

reinforcement of the Navy. Contracts should be given at prices sufficient to yield a fair profit. The penalties for delay should be enforced.

XII.

British naval administration.

Any attempt to review the naval administration on the vast scale which the defence of the British Empire demands must be imperfect and unsatisfactory. There is much more to say if space and time permitted.

It is a very agreeable duty to pay a well-merited tribute of praise to the great departments of the Admiralty. They achieve their enormous task with as large a measure of success as it is reasonable to look for in all the circumstances of unceasing change and progress with which they have to deal. Certainly no foreign administration does better. Under none is there so little wasteful expenditure. No Service produces a finer body of officers and men; none possesses more powerful ships. No Administration is supported with a liberality so large as that which the British Parliament has in late years bestowed on the Navy. It has not been thought necessary to press for additional expenditure on the Navy. A forward movement is certain to be general, leaving the relative position unchanged, while the taxpayer is burdened. In this connection it should not be put out of view that the strength of the British Navy rests on a broad foundation.

Our Empire comprises one-fourth of the population of the globe. The combined trade and revenues are fully proportionate to the numbers of the people. As an evidence of our maritime resources we may compare the 1,502,000 tons of shipping built in 1900 for the British Empire with the combined construction of all other countries.

In closing this contribution to the *Naval Annual* it is a pleasing duty to pay the tribute he so abundantly deserves to Viscount Goschen for his long and most able and valuable service in the administration of the Navy. To Lord Selborne the Navy and Parliament are ready to give their full confidence. He bears a heavy responsibility, which it is the duty of all patriotic men who interest themselves in naval affairs in some sense to share by suggestions, offered in no party spirit, and with a single desire to promote the efficiency of the Service.

BRASSEY.

CHAPTER II.

Progress of the British Navy.

It was pointed out in the *Annual* last year that of the programme of 1896–97 three battleships—the Canopus, Goliath, and Ocean—had been completed and commissioned. The remaining battleships of the same programme and type are the Glory, Albion, and Vengeance. With regard to these three vessels, the Glory was floated out of dock at Birkenhead on March 11, 1899, and her trials are reported in last year's *Annual*. She was commissioned on November 1, 1900, and is now in China waters. The Albion, having been launched at Blackwall on June 21, 1898, was delivered by the contractors during the past year, and began her trials on March 14, 1901. The results of these are taken from the report in the *Times*:— **Programme of 1896–97.**
The vessel left the Nore on Thursday (March 14) morning, the trial beginning at 9.45 A.M. A course was steered down the English Channel to the Start Point, which was reached at midnight, when the vessel was turned towards the east, arriving at the Nore about 4.30 on Friday afternoon. The machinery and boilers worked smoothly during the whole of the trial, there being no incident of any kind. The boilers provided a continuous and sufficient supply of steam under natural draught conditions, no fans, air-blowers, or other means being used for the purpose of assisting combustion. The contract power under these conditions was 10,250 I.H.P. The actual mean results of the thirty hours' steaming were ascertained at the end of the trial to be 10,809 I.H.P. The speed of the vessel was 16·8 knots. The mean results for thirty hours were as follows:—Steam pressure at boilers, 244 lbs. per square inch; steam pressure at engines, 199 lbs. per square inch; revolutions per minute, starboard, 102·6; revolutions per minute, port, 101·8; vacuum in condensers, starboard, 27·7; vacuum in condensers, port, 27; I.H.P., starboard, 5294; I.H.P., port, 5515; mean total for thirty hours, 10,809; consumption of coal for all purposes, 1·8 lbs. per I.H.P. per hour. The engines are of the usual vertical triple expansion type, steam being supplied by twenty Belleville boilers, arranged in three stokeholds. The results of the eight-hours'

full-power trial carried out on March 28 were also satisfactory, the power obtained being 13,885, and the speed 17·8 knots.

The last ship of this group is the Vengeance, which was launched from Messrs. Vickers, Son, and Maxim's yard on July 25, 1899. She is still at Barrow, where she is, it is reported, to be completed. A full description of this vessel was given in last year's *Annual.*

Programme of 1897-98.

The battleships of the 1897–98 programme are the Formidable, Irresistible, and Implacable, and the type was described in the *Annual* for 1899. The Formidable is at Portsmouth, the Irresistible at Chatham, and the Implacable at Devonport. The Formidable has begun her trials, the Irresistible is nearly ready to begin hers, and the Implacable's have been completed with success. The thirty-hours' trial of the last-named vessel at one-fifth the full power took place on January 18. The mean results were as follows:—Steam in boilers, 220 lbs.; vacuum, 28 in.; revolutions, 66; I.H.P., 3265; speed, 11·10 knots. The eight-hours' full-speed trial was carried out on March 15 and 16, with the following mean results:—Steam at boilers, starboard, 270 lbs.; port, 270 lbs.; steam at engine, starboard, 243 lbs.; port, 242 lbs.; vacuum, starboard, 27 in.; port, 27 in.; revolutions, starboard, 109·1; port, 108; pressure at cylinders, high-pressure cylinders, starboard, 101·8; port, 104·8; intermediate, starboard, 43·7; port, 39·5; low, starboard, 18·7; port, 19·4; I.H.P., high-pressure cylinder, starboard, 2230; port, 2273; intermediate, starboard, 2552; port, 2289; low, starboard, 2914; port, 2986; total, starboard, 7696; port, 7548; gross total, 15,244. The coal consumption was 1·88 lb. per I.H.P. per hour, and speed, 18·22 knots.

Programme of 1898-99.

The battleships of the 1898–99 programme, which were described in the *Annual* of last year, are the Venerable, London, and Bulwark. The London is at Portsmouth, the Bulwark at Devonport, and the Venerable at Chatham. These three vessels are still completing; they were all launched in 1899.

Four other battleships appeared in the Supplemental Programme of 1898–99, these vessels being the Duncan and Cornwallis, laid down at the Thames Ironworks on July 19, 1899; the Exmouth, laid down at Messrs. Laird's at Birkenhead, and the Russell, at the Palmer Shipbuilding Company's yard at Jarrow, in the same year. The last-named vessel was launched on February 19, 1901, and the following description of her was given in the *Times* of that date:—

> The principal dimensions are: length between perpendiculars, 405 ft.; breadth, 75 ft. 6 in.; draught, 26 ft. 6 in.; displacement, 14,000 tons; indicated horse-power, 18,000; speed, 19 knots. She is of steel throughout, and is built on the longitudinal system; the stem, sternpost, propeller shaft brackets, and ram of massive strength are formed of steel castings. The hull is divided into 320 water-tight compartments, and

there is a double bottom, extending four-fifths of her total length, under the engine and boiler rooms, magazines, and shell-room spaces. The port and starboard engine-rooms are divided by a middle line water-tight bulkhead extending from the keel to main deck 10 ft. above the load water-line. There are three boiler rooms, each being a separate water-tight compartment, and containing in all twenty-four Belleville water-tube boilers. There are longitudinal water-tight bulkheads at the sides extending throughout the machinery and boiler spaces, and subdivided off by athwartship water-tight bulkheads, forming in all fifty-two coal bunkers which act as an additional protection to the engines and boilers. On the platform and lower decks is placed the auxiliary machinery for the working of the ship, including electric engines, hydraulic pumping engines, capstan engines, air compressors, &c., as well as a fully equipped engineers' workshop and numerous store-rooms.

The officers and crew are accommodated on the middle and main decks, the admiral and captain having day-cabins on the upper deck. The officers' accommodation consists of cabins situated aft, those for the superior officers being on the main deck. The admiral's accommodation is at the extreme aft end of the main deck, with access to a handsome stern walk fitted with a light steel canopy. The upper deck extends from stem to stern without a break, and above it are the forward and after shelter decks, on which are placed the conning towers, the latter being of 12-in. Harveyed steel, and the ormer of 3-in. nickel steel; these are surmounted by flying bridges, and connected on each side by a fore and aft bridge. The boats, of which there are eighteen, including two 56-ft. steam pinnaces, are stowed amidships on skid beams. A strong steel derrick, worked by hydraulic power, tested to 36 tons lift, is fitted to the mainmast for lifting them, and the foremast is also fitted with two steel derricks of 10 tons test each, for working those of a lighter description. The fore and main lower masts are built of steel, and fitted with military fighting tops and searchlight platforms, with wood top-masts and upper and lower signalling yards. There are two funnels in fore and aft line between the masts.

The barbettes, one forward and one aft, rise from the middle deck and project a few feet above the upper deck, protected by 10-in. and 11-in. Harveyed armour, and inside are powerful hydraulic turning engines, and all the gear necessary for controlling the ponderous turn-table, carrying two 12-in. b.l. guns in a specially protected shield in each barbette. The main deck, which forms the top of the armoured citadel, is a protective deck 2 in. thick, enclosing the barbettes, and reduced to 1 in. thick at the stem. The middle deck, which is a protective deck of 1 in. steel, is horizontal in the centre, 2 ft. 6 in. above the load-line, and sloped down at an angle of about 40 degrees at the sides to 5 ft. below the load-line, which forms the shelf on which the side armour rests, this protective deck running in this form from after to forward barbettes, of which it is the foundation; it then dips down at the centre, gradually losing the angles at each side, and eventually forming the lower deck, still retaining its protective thickness right to the stem casting, to which it is strongly secured. Before and abaft of the barbettes the line of this deck is continued as an ordinary deck. The lower deck is a sloping protective deck of 1 in. thickness before the forward barbette, and 2 in. thick aft of the after barbette, and protecting the steering gear, &c. The sides of the vessel are protected from stern to transverse armoured bulkhead with two thicknesses of ½-in. nickel steel on ½-in. ordinary steel plating, and from armoured bulkhead to a distance of 286 ft. by 7-in. Harveyed armour about 14 ft. wide in wake of barbettes, reducing gradually to 2-in. nickel which finishes in the rabbit on stem, giving great rigidity to the powerful ram. Behind this belt of armour coal bunkers are arranged whereby a large amount of additional protection is secured. With a view to preventing water from finding its way below the protective deck, means are provided for closing the several openings by water-tight shutters and covers, while in the case of those which must necessarily remain open in action coffer-dams have been fitted with the same object.

The main armament consists of four 50-ton breechloading guns of 12-in. calibre, with a training of 120 degrees each side of the middle line. The auxiliary armament consists of twelve 6-in. quick-firing guns, each placed in a casemate of Harveyed armour 6-in. thick. Four of these are on the upper deck, the two forward ones training over the bow and 30 degrees abaft the beam, and the two after ones training over the stern and 30 degrees before the beam. The other eight are situated on the main deck, the four forward and aft trained the same as the guns on the upper deck, and the four in the midships are trained 60 degrees before and abaft the beam. Twelve 12-pounders, two in the bows and two in the after-quarter on the main deck, and six in waist of ship on upper deck, and two on forward shelter deck, the latter being field and boat guns, eight Maxims on shelters and bridges, and six 3-pounders, three in each military fighting top. Four submerged 18-in. torpedo tubes, two forward and two aft.

The ship will be lighted throughout by electricity, with an installation of about 900 electric lamps, and will also be equipped with six searchlights of 25,000 candle-power each, the dynamos being under protection. Means are so arranged that when in action she can be fought from either of the two conning towers. The main propelling engines

are twin screw, and are also constructed by Palmer's Company, each set consisting of four cylinders—*i.e.*, one high pressure 33½ in. diameter, one intermediate pressure 54½ in. diameter, and two low pressure each 63 in. diameter, the stroke of all being 4 ft. The engines will be run at 120 revolutions per minute. Steam is supplied by twenty-four boilers of the Belleville type, the total tube surface being nearly 45,000 square feet. The working pressure of the boilers is 300 lb. per square inch, reduced at the engines to 250 lb. per square inch. In addition to the main propelling engines, there are steering engines, electric light engines and dynamos, air-compressing engines, distilling machinery, coal-hoisting machinery, hydraulic boat hoists, capstans, workshop engines, and about seventy other auxiliary engines, such as feed pumps, fire and bilge pumps, fans and engines, air-blowing engines, ash hoists, centrifugal pumping engines, &c.

The weight of the Russell, when she was launched, was 5950 tons, and her contract delivery date is February, 1902. It is anticipated, however, that she will be delivered somewhat earlier, as good progress has been made on her. The Exmouth is rapidly approaching a state fit for floating out of dock, having now nearly 5000 tons of material worked into her hull, exclusive of armour, and about a third of the heavy citadel armour in place. Her machinery has been erected, and is well advanced. The Duncan was launched on March 21, and the Cornwallis will be launched on June 18 of the current year.

Programme of 1899-1900.

The battleships of the 1899–1900 programme are the Montagu, laid down at Devonport on November 23, 1899, and the Albemarle, laid down at Chatham on January 1, 1900. These two vessels were launched on March 5, 1901. They are of the same class as the Russell, described above. The launching weight of the Albemarle was 5100 tons, and that of the Montagu 4987 tons.

Programme of 1900-1901.

The battleships of the 1900–01 programme, the Queen, at Devonport, and the Prince of Wales, at Chatham, have taken the places on the stocks of the vessels last named, but will be heavier than these and somewhat differently armed. Their dimensions are as follows: Length, 400 ft.; breadth, 75 ft.; mean load draught, 26 ft. 9 in.; displacement, 15,000 tons. The armour will include a steel belt, commencing about 30 ft. from the bow and running a distance of 220 ft. towards the after part of the ship. This belt will be 15 ft. deep and of 9-in. armour plates. There will be a curved, transverse bulkhead, near the after barbette, made of 12-in. armour plates, while the barbettes themselves will be built of plates varying from 6 in. to 12 in. thick. A protective deck covering the vital parts has been provided for, this being of the turtle-back shape, having a thickness of 1 in. on the flat and 2 in. on the slopes. The barbette hoods will be of 8-in. and 10-in. armour, and the casemates for the 7-in. and 6-in. guns will consist of 6-in. plates. The armament will comprise four 12-in. 50-ton wire-wound, breechloading guns, mounted in pairs in two barbettes—one forward and the other aft; eight 7·5-in. modified Q.F. guns of a new type; eight or ten 6-in. Q.F.

guns; sixteen 12-pounders (12 cwt.), and two 12-pounders (8 cwt.); six 3-pounder Hotchkiss, eight ·45-in. Maxim machine guns, and four submerged Whitehead torpedo-tubes. The engines are to develop about 20,000 I.H.P., giving a speed of 19 knots.

In this year's programme three battleships are mentioned, two of which are to be built at Portsmouth and Devonport respectively, and the third by contract. In the estimates it is stated that the design of these ships is not complete, and the sums which it is proposed will be spent on their construction during the current financial year are (1) £40,186; (2) £32,770; (3) £12,192. Programme of 1901-1902.

An estimate of the relative rate of progress made on the battleships of the later programmes may be formed from the following tables. The six ships of the Formidable class have been considerably advanced. The Implacable is to be ready for the pennant during June, the Formidable and Irresistible should be finished in the summer of 1901, and the Bulwark in December. The London and Venerable are to be completed by May, 1902.

DOCKYARD BUILT.

Ship.	Dimensions, &c. Length.	Breadth.	Draught.	Tonnage.	Laid Down.	Date of Launch.	Total probable Expenditure on Hull, &c. to Mar. 31, 1901 (exclusive of Armour).	Proportion of Total Estimated Cost of Hull, &c. (exclusive of Armour).
	ft.	ft. in.	ft. in.	tons.			£	
DUNCAN CLASS:								
Albemarle	405	75 6	26 6	14,000	Jan. 8, 1900	Mar. 5, 1901	179,378	·464
Montagu					Nov. 23, 1899	Mar. 5, 1901	169,746	·438

CONTRACT BUILT.

Ship.	Length.	Breadth.	Draught.	Tonnage.	Laid Down.	Date of Launch.	Total probable Expenditure	Proportion
DUNCAN CLASS:								
Duncan	405	75 6	26 6	14,000	July 10, 1899	Mar. 21, 1901	229,089	·517
Cornwallis					July 13, 1899	*June 18, 1901	196,477	·442
Exmouth					Aug. 10, 1899	Not fixed	188,663	·421
Russell					Mar. 11, 1899	Feb. 19, 1901	234,696	·513

* Probable date.

The armoured cruisers in hand are of three classes, of 14,100 tons displacement, 12,000 tons, and 9800 tons respectively, and are known as the Drake, Cressy, and Kent (or County) classes. Of the Cressy class six ships are under construction. The Sutlej was launched at Clydebank on November 18, 1899, and the Cressy at the Fairfield Company's works at Govan on December 4, 1899. During the past Armoured cruisers.

year three other vessels of this class have taken the water—the Aboukir at Govan on May 16, the Hogue at Barrow on August 13, and the Bacchante at Clydebank on February 21. The remaining vessel of this class on the stocks is the Euryalus, building at Barrow. This vessel was to be ready for launching in April, 1901, but the actual date on which she would take the water depended on the completion of the Ramsden Dock sill. The vessels of this class were briefly described in the *Naval Annual* for 1899. The following additional details are taken from official particulars, others furnished by the builders of the Hogue, and information from other sources:—

The Hogue is of the Cressy type, and in some respects resembles the Powerful, embodying features of that ship, with the addition of an armoured belt of considerable area. The displacement is 12,000 tons. The hull is sheathed with teak and coppered. The armament comprises two 9·2-in. (22-ton) guns, each mounted in an armoured barbette, the mountings being of special design, by which the guns can be loaded at any angle of elevation or training. There are also eight 6-in. guns, twelve 12-pr. Q.F. guns, and a number of machine guns. The four boiler compartments of the Hogue take up 130 ft. of the length of the ship; the coal bunkers being arranged on either side of the boiler rooms and over the protective deck, and an ammunition passage is situated immediately under the protective deck. There is also an athwartships bunker right forward. Thirty boilers are carried, all of the Belleville type. The Hogue is about 5 ft. longer than the Diadem class, and has a few inches more beam and draught. She is, however, built on finer lines forward, and, though this gives her a more lively pitch in a seaway, her speed and stability are improved. The special characteristic of the Hogue is her armour, which weighs 1100 tons, and some small economies have had to be effected to give her only 1000 tons more displacement than the Diadem. For instance, in the Hogue, in the wake of the citadel, the deck consists of only two ½-in. plates, while the protective deck is not so thick as in the Diadem. The belt, which is coterminous with the citadel, has a length of 230 ft. and a depth of 11 ft. 6 in.—that is to say, beginning at the main deck, it goes to a depth of 5 ft. below the water-line, where it joins the protective deck, thus completely enclosing in armour the vital parts of the ship. Throughout the armour is of Harveyized steel, of a thickness of 6 in. at the belt and of 5 in. at the thwartship bulkheads at either end of the citadel. Forward of the citadel the structure is stiffened by 2 in. of nickel steel to support the ram and to keep out small projectiles. The conning tower is of the thickness of 12 in. Above the belt are the 12 6-in. Q.F. guns, and these are carried in 6-in. casemates, but with no other armoured protection.

The Cressy was delivered at Portsmouth in October, 1900, from the works of the Fairfield Company, and subsequently went through the whole of her contractor's trials with remarkable success. As reported in the *Times* of December 17—

"During her eight hours' full-power trial, when the wind and sea materially reduced her speed, she averaged 20·7 knots, while her engines worked so uniformly that the I.H.P. was 10,473 starboard and 10,767 port, but the difference between the power of the two engines at the preceding thirty hours' trial at four-fifths power was only 12, the I.H.P. starboard being 8141 and port 8129, while the revolutions on both sides were identical, being 1·146 starboard and port. During this trial the vessel made five runs over the deep-sea course at a mean speed of 20·596, or only a fraction less than that recorded at the full-power trial. It is not customary to record the coal consumption at a

full-power run, but it was taken in the case of the Cressy, and worked out at 1·93 per unit of power per hour, but at the four-fifths power run it was only 1·79."

The four armoured cruisers of the Drake class are building at Pembroke, the Good Hope (late Africa) at Govan, the Leviathan at Clydebank, and the King Alfred at Barrow. Of these four ships the Good Hope was launched on February 21 and the Drake on March 5. The other two are yet on the slips; but the King Alfred will be ready for launching in August. The Drake Class.

The design of the vessels of the Drake class is practically identical in principle with that of the cruisers of the Cressy and Monmouth classes; that is to say, it is a combination of two thick armoured decks, with vertical side plating. The principal dimensions are:—Length between perpendiculars, 500 ft.: extreme breadth, 71 ft. 4 in.: mean load draught, 26 ft.; displacement at load draught, 14,150 tons. The boiler and engine-rooms occupy the middle portion of the ship below, and magazines, shell-rooms, and stores of one kind and another, the lower parts at the ends Above the lower deck for a considerable distance, on the fore side of the armour bulkhead, the space between it and the main deck forms coal bunkers which, when full of coal, will greatly increase the protection afforded to the vital parts below them. Underneath the lower deck, on each side, are ammunition passages, which enable the ammunition to be conveyed under protection to armour tubes, which communicate between it and the casemates. The space between the lower and main decks, at the fore end, is occupied by store-rooms, and at the after end warrant-officers' cabins, pantries, &c., will be constructed. On the main deck aft, the officers' cabins will be built, while forward, and between the casemates, which are situated at intervals along the side, four in number on each side, the crew will be accommodated. The casemates are in every case double storied. They are to be formed of 6-in. Krupp armour-plates in front, and 2-in. plates at the sides and rear. At the fore and after ends of the ship are the barbettes for mounting the two 9·2 B.L. guns, protected by 6-in. armour. Sixteen 6-in. B.L. guns will be mounted, one in each casemate, twelve 12-pounder Q.F. guns on the upper deck, and the minor armament will consist of two boat and field 12-pounders, and three 3-pounder Q.F. guns. They will also carry nine ·75 Maxims, with two submerged torpedo-tubes, each capable of discharging 18-in. torpedoes. The propelling or driving machinery consists of twin screws driven by independent sets of vertical triple-expansion engines, with inverted cylinders, the diameters of which are: high pressure, 43½ in.; intermediate, 71 in.; and low pressure (two in number), 81½ in. The main condensers will have a cooling surface of 32,000 square feet, and the auxiliary condensers, 3450 square feet. Steam will be supplied by forty-three Belleville boilers, which will be fitted with economisers. The boilers comprise a total of 5348 tubes, with 47,520 square feet of surface, and the economisers 5328 tubes, with 24,450 square feet of surface. There will be forty-three fire-grates, with a total heating surface of 2310 square feet. The engines are expected to indicate 30,000 horse-power, giving the ship a speed of 23 knots. They will be required to maintain their full power for eight hours continuously on the official trial. In smooth water at sea 21 knots is to be the steady speed. Electricity for lighting purposes will be supplied from four dynamos.

Of the vessels of the Monmouth class two belong to the programme of '98–99; the Kent, laid down at Portsmouth February 12, 1900, and launched March 6, 1901; and the Essex, laid down at Pembroke January 1, 1900, and expected to be ready for launching in August or September next. Two are of the programme of '99–1900, the Monmouth and Bedford, both building by the Fairfield Company at Govan. These vessels should be ready for launching in May and June respectively. The remaining six are of last year's programme. They have been, or are to be, laid down as follows:—The Cornwall at Pembroke, on the slips from which the Drake was launched; the Suffolk at Portsmouth, in the place of the Kent; the Berwick by The Monmouth or "County" Class.

Messrs. Beardmore and Co., Limited; the Cumberland by the London and Glasgow Shipbuilding Company, Limited; the Donegal by the Fairfield Company; and the Lancaster at Elswick.

With regard to this class, the following comments on their design are taken from an article on the subject in the *Engineer* of October 12, 1900.

The principal particulars of the type are as follows:—

Displacement	9800 tons.
Length	440 ft.
Beam	60 ft.
Draught—mean	24½ ft.
Armament	Fourteen 6-in., 45 calibre; ten 12-pounders; three 3-pounders; and an indefinite number of Maxims, probably eight.
Torpedo-tubes...	Two 18-in. submerged.

In the arrangement of her guns the Essex closely resembles the Renown, and bears much the same ratio to the big armoured cruisers of the Drake and Cressy classes that the Renown bears to the Majestic class; the only striking difference is that the Essex has the high forecastle common to all our cruisers nowadays, and that the 12-pounder battery amidships is open as in the Duncan. As for these differences, the high forecastle is absolutely indispensable to a swift cruiser. Earlier cruisers, like the Blake and Edgar classes, suffer a good deal in bad weather from the sea they take in forward: the effect of which is noticeable in two vessels of the class—Crescent and Royal Arthur, which had their forecastles built up to improve their steaming qualities in bad weather. The more or less open upper deck is, we believe, the result of a report sent in by Captain H. J. May, R.N., who pointed out that the high bulwarks in the Majestic, and later types up to the Duncan, would simply burst shells in the worst possible place—*i.e.*, just in front of men at the guns. The compromise in the Essex design falls a good deal short of Captain May's ideal, which was to have the 12-pounders absolutely unencumbered by boats, davits, stanchions, or anything else—still it is a vast improvement upon the older idea of high bulwarks. All fourteen 6-in. guns are protected in the Essex, being mounted in armoured casemates. The armour of the Essex is thin and extensive. There is a belt about 250 ft. long amidships of 4-in. Krupp cemented armour, and this belt extends right up to the main deck. It is continued to the bow at a thickness of 2 in. Aft it is terminated by a 5-in. bulkhead. A curved protective deck runs throughout the length of the ship and reinforces the water-line protection. The space above and below is filled, as usual, with coal bunkers. The casemates are 4 in. thick, the turrets 5 in., but for these nickel armour, not Krupp, is employed. It has less resisting power, but is more easily worked. There is said to be great difficulty in using Krupp armour for circular or nearly circular turrets. These turrets have short armoured bases of 5 in. thickness, with armoured hoists going down the main deck. The turrets are distinctive and, so far, peculiar to the Essex class. To begin with, the guns in each can be trained together and fired as one piece or else used independently. There is a single hoist to the pair of guns, worked by an electric motor. It serves with very great rapidity, and when in full working order delivers every alternate charge to the port gun, which has a special small motor to catch it as it comes up the endless chain. This arrangement can be easily disconnected—the hoist is then made to serve one gun only. It remains to be added that three layers of projectiles are carried in the turret underneath the guns, which can be loaded in any position or elevation. Double hoists, adapted from the same system, will, it is said, be fitted to the two-storey casemates.

A similar table to that prepared for the later battleships is placed below in order that the present state of the three classes of cruisers may be seen. Of the twenty under construction the Cressy only has carried out her steam trials. Preliminary trials have been made with the new mounting for her 9·2-in. guns, and her gunnery trials are to take place early in April. The Sutlej has been delivered at

Chatham, and is preparing for steam trials. The Aboukir is to be delivered almost immediately.

DOCKYARD BUILT.

Ship.	Dimensions, &c. Length.	Breadth.	Draught.	Tonnage.	Laid Down.	Date of Launch.	Total probable Expenditure on Hull, &c., to Mar. 31, 1901, (exclusive of Armour).	Proportion of Total Estimated Cost of Hull, &c. (exclusive of Armour).
	ft.	ft. in.	ft. in.	tons.			£	
DRAKE CLASS:								
Drake	500	71 0	26 0	14,100	Apr. 24, 1899	Mar. 5, 1901	255,653	·644
MONMOUTH CLASS:								
Kent	440	66 0	24 6	9,800	Feb. 12, 1900	Mar. 6, 1901	150,943	·516
Essex					Jan. 1, 1900	Aug., 1901	135,718	·464
Cornwall					Mar. 11, 1901	—	40,690	·139
Suffolk					—	—	41,340	·141

CONTRACT BUILT.

Ship.	Length.	Breadth.	Draught.	Tonnage.	Laid Down.	Date of Launch.	Total probable Expenditure	Proportion
DRAKE CLASS:								
Leviathan	500	71 0	26 0	14,100	Nov. 30, 1899	Uncertain	130 484	·303
Good Hope					Sept. 11, 1899	Feb. 21, 1901	203,425	·481
King Alfred					Aug. 11, 1899	*Aug., 1901	139,690	·325
MONMOUTH CLASS:								
Monmouth	440	66 0	24 6	9,800	Aug. 29, 1899	*May, 1901	110,538	·364
Bedford					Feb. 19, 1900	*June, 1901	150,692	·467
Berwick					—	—	10,375	·034
Cumberland					Feb. 19, 1901	—	10,930	·034
Donegal					Feb. 14, 1901	*Feb., 1902	10,870	·034
Lancaster					—	—	11,125	·034
CRESSY CLASS:								
Aboukir	440	69 6	26 3	12,000	Nov. 9, 1898	May 16, 1900	308,105	·880
Cressy					Oct. 12, 1898	Dec. 4, 1899	339,029	·966
Hogue					July 14, 1898	Aug. 13, 1900	272,049	·747
Sutlej					Aug. 15, 1898	Nov. 18, 1899	333,826	·919
Euryalus					July 18, 1899	*May, 1901	181,439	·471
Bacchante					Feb. 15, 1899	Feb. 21, 1901	214,209	·602

* Probable dates.

Six armoured cruisers are in this year's programme, of which number one is to be built at Chatham, the others by contract.

Protected cruisers.

Of first-class protected cruisers the only vessel which remained uncompleted last year was the Spartiate, laid down at Pembroke on May 10, 1897, and launched October 27, 1898. This vessel has been delivered at Portsmouth, where, in November last, she began her trials, with the following results. She first made a satisfactory official trial at one-fifth her full power, and, on that occasion, she drew 24 ft. 6 in. forward and 26 ft. 5 in. aft, and had 215 lbs. of steam to the square inch in her boilers. The total I.H.P. was 3834, and the mean speed 12·3 knots. The coal consumption worked out at 1·83 lbs. per unit of power per hour. She used only ten out of her thirty Belleville boilers, which gave no trouble of any kind. A few days afterwards she left Portsmouth for a thirty-hours' trial at four-fifths her power, but had to return, as four hours after the run began, one after another, in quick succession, the bearings became overheated. The trial was at once stopped, and the vessel was placed in the Dockyard hands before resuming her trials. A condemned crank shaft has to be replaced.

Second-class cruiser.

The new second-class cruiser of an improved Hermes type, referred to on page 17 in last year's *Annual*, is building at Chatham, and will be named the Challenger. She was laid down on December 1, 1900. The new vessel will be much larger than any of the second-class cruisers now afloat, and will deviate from those recently constructed. She will be 355 ft. long, 56 ft. wide, and have a displacement of about 5880 tons. It is intended that she shall be fitted with Babcock and Wilcox boilers, and engines of 12,500 I.H.P. The draught forward is to be 19 ft. 3 in., and aft 21 ft. 3 in. It will be noted that she is only five feet shorter than the Crescent and Edgar classes. A similar ship of the same programme was laid down at Devonport on January 28, 1901, and will be named the Encounter. The engines and boilers of this vessel are to be made at Keyham. Good progress has been made in the construction of both these vessels. The Encounter was proposed to be fitted with Belleville boilers.

Special attention has been directed to an earlier type of second-class cruiser by the mishaps which have befallen the Hermes. This vessel was commissioned for the North America and West Indies Station in October 1899, and soon after she arrived on the station her boilers gave considerable trouble. While on passage from Bermuda to Halifax she became completely disabled, and had to be towed into harbour. After repairs the defects in her boilers became again manifest, and she was eventually ordered to return home, and it is understood that she will have to be provided with new boilers. The

Highflyer, a sister ship, was commissioned on December 7, 1899, as flagship in the East Indies. On a two hours' full power trial of the ship, the following mean results were obtained:—Steam in boilers 295 lbs., at engines 241 lbs.; vacuum, starboard 24·5 in., port 25·1 in.; revolutions, starboard 180·4, port 178·9; I.H.P., starboard 5180, port 5005—total, 10,185; air pressure, ·22 in.; speed, 19 knots. The Hyacinth, the third vessel of this type, was commissioned on September 3, 1900, and has been employed in making a series of trials under the supervision of the special Boiler Committee.

The Pandora, mentioned in last year's *Annual*, which was built and engined at Portsmouth, went through her trials in December with the following results: On the thirty hours' half-power, with a mean of 195 revolutions, she made 3638 mean I.H.P., and a mean speed of 16·7 knots. Her coal consumption was 2·11 lbs. per horse-power. She is the last of the "P" class, the corresponding trials of which were as follows:— Third-class cruisers.

Name.	Hours.	I.H.P.	Knots.
Pelorus	60	4277	17·3
Proserpine	60	3615	17
Pactolus	30	3631	16·6
Pegasus	30	3698	17·3
Pomone	30	3604	16·5
Prometheus	30	3556	17·5
Pyramus	—	3605	17·5
Pioneer	—	3665	16·3
Psyche	—	3647	16·8
Pandora	—	3638	16·7
Perseus (not available).			

Two third-class cruisers, to be built by contract, are in the new programme of shipbuilding.

In addition to the vessels named under the head of sloops in last year's *Annual*, the two which appeared in the programme for 1900–1, were laid down at Sheerness on February 11, 1901. They are to be called the Merlin and Odin. There are now, altogether, ten vessels of this type, of which the two earliest, the Condor and Rosario, are in commission—the one in the Pacific, the other in China. The Shearwater and the Vestal underwent their trials during the latter part of 1900; these vessels were laid down February 1, 1899, and were floated on February 10, 1900. The following are the results of their trials:— Sloops.

Eight Hours' Natural Draught Trials.

Name.	Coal per I.H.P. per Hour.	Total I.H.P.	Mean Revolutions.	Speed.
Shearwater ...	1·57 lbs.	1432·3	194·2	13·5 knots
Vestal	1·55 lbs.	1484·7	204·8	13·56 „

Both ships afterwards underwent a series of trials to ascertain the consumption of coal and water, the results being highly satisfactory in each case. The Vestal's engines and boilers were manufactured at Keyham, while those for the Shearwater were supplied by the Thames Ironworks and Shipbuilding Co. The coal consumption of the Vestal for the thirty-hours' run at 300 horse-power was 1·57 lbs. per horse-power per hour compared with 1·88 lbs. for the Shearwater. At the thirty-hours trial at five-sevenths horse power the Vestal's I.H.P. was 1014·6, with a coal consumption of 1·42 lbs. per I.H.P. per hour; on the other hand, the Shearwater's I.H.P. was 1024·5 and her coal consumption 1·73 lbs. per I.H.P. per hour. These two vessels have been completed and passed into the Reserve.

Of the other vessels of the same type, the Mutine and Rinaldo, building at Laird's, have been launched, and the former has been delivered. The Espiègle and Fantôme have also been launched at Sheerness, and their places occupied by the Odin and Merlin. The boilers of the Espiègle are of the Babcock and Willcox water-tube type, and her engines have been supplied by the Wallsend Slipway and Engineering Co. The Fantôme will be fitted with Niclausse boilers.

The trials of the Mutine have been concluded, and were most satisfactory. The following are particulars of the eight hours' full-power natural draught trial:—Draught of water—forward, 9 ft. 10½ in.; aft, 12 ft. 11 in.; pressure of steam in boilers, 225·2 lbs.; ditto in engine-room, 215·6 lbs.; air pressure, ·17 in.; vacuum, 26·4 in.; revolutions, 206·5 per minute; I.H.P.—high, 483·9; intermediate, 428·8; low, 577·9—total, 1490·6 I.H.P.; speed by the patent log, 14·55 knots; speed on the measured mile, 13·74 knots. The machinery and Belleville boilers worked satisfactorily throughout.

Gunboats. Two gunboats of light draught, the Teal and Moorhen, have been begun in the past year, and are now well advanced.

Destroyers. The table on the opposite page, published in *Engineering* of December 28, gives particulars of the trials of torpedo-boat destroyers in 1900.

The most important boat of those mentioned in this table is the Albatross, which is not only heavier than the others but has higher power and speed. Comparisons were drawn between the coal consumption of this boat and that of the Viper fitted with Parsons's steam turbine, and these elicited an interesting correspondence in the *Times*. Of the five destroyers with speeds of over 30 knots the two above mentioned have completed their trials. The Cobra has been tried, and for three hours exceeded the 30 knot speed. Two others are to be delivered shortly. Altogether, at the close of the financial year,

ten destroyers remained to be delivered, but five additional vessels have been purchased and are to be delivered this year. There are ten new destroyers in this year's programme. During the year the Lively, torpedo-boat destroyer, was launched from the yard of Messrs. Laird Bros., at Birkenhead, making the eighteenth vessel of this class built by the firm for the Navy.

TRIALS OF TORPEDO-BOAT DESTROYERS DURING THE YEAR 1900.

Name of Firm and Engineer.	Name of Vessel.	Approximate Displacement.	Type of Boilers.	Grate Area.	Tube Surface.	I.H.P.	Speed in Knots.	Pounds of Coal per I.H.P. per Hour.
		tons.		sq. ft.	sq. ft.			
John Brown and Co., Limited ..	Brazen	318	Clydebank Normand	224	12,000	6539 6734	29·565 29·418	2·5 —
	Electra	319	,,	224	12,000	466 6567 6751	12·963 29·557 29·583	1·61 2·32 —
	Recruit	324	,,	224	12,000	6581 6521	29·319 29·268	2·33 —
	Thorn	342	,,	224	12,652	6540 6455	30·174 30·063	2·34 —
	Tiger	339	,,	224	12,6·2	6840 6409	29·921 30·056	2·34 —
	Vigilant	338	,,	224	12,652	6218 6507	30·094 30·147	2·38 —
J. I. Thornycroft and Co. ..	Albatross	360	Thornycroft	252	16,020	718 7732 7678	14·330 31·552 31·500	1·97 2·26 —
	Stag	306	,,	193	12,072	406 5204 5561	13·081 30·156 30·345	2·25 2·307 —
Earle's Shipbuilding and Engineering Company, Limited	Bullfinch	318	,,	236	13,400	6022	29·460	2·37
	Dove	322	,,	236	13,400	5802 6012	29·250 29·363	2·75 —
Fairfield Shipbuilding and Engineering Company	Falcon	333	,,	245	13,000	6299 6318	30·135 30·099	2·22 —
	Ostrich	331	,,	245	13,000	437 6311 6172	13·040 30·113 30·161	1·549 2·206 —
Palmer's Shipbuilding Company	Peterel	340	Reed	258	13,784	6444 9320	30·097 30·054	2·300 —
Doxford	Lee	322	Thornycroft	237	13,520	6558 6265	30·110 30·078	2·535 —
Hanna, Donald, and Wilson ..	Zephyr	326	Reed	238	9,936	3885	27·171	—
Hawthorn, Leslie, and Co.	Havock (trial after reboilering)	..	Modified Yarrow	150	8,512	419 Power trial only 3713	12·971 —	2·56 —

In addition to the above vessels, the Viper and Cobra, fitted with turbine engines by the Parsons Marine Turbine Company, have run their official trials. These two vessels, built by Messrs. Hawthorn, Leslie, and Co. and Messrs. Armstrong, Whitworth, and Co. respectively, have boilers of the modified Yarrow type, made by Messrs. Hawthorn, Leslie, and Co., with a grate area of about 276 square feet, and a tube surface of about 15,044 square feet per vessel.

An improved type of torpedo-boat, known as No. 98, being the first of the four mentioned on page 20 of the *Annual* last year, was launched from the yard of Messrs. Thornycroft and Co., of Chiswick, on January 22. The dimensions of this vessel are 160 ft. long by 17 ft. beam, 8 ft. 4 in. draught, 128 tons displacement. She has a heavier armament than any boat yet built, and, with 2850 indicated horse-power, is to develop the high speed of 25 knots with a full load of 42 tons on board. The engines are of the Thornycroft patent balance type, and the boilers are of their water-tube type, which have Torpedo-boats.

worked successfully in the destroyers built by this firm for the British and other Governments. It is anticipated that the large size necessary for the increased speed and heavy load compared with the earlier boats will enable this type of vessel to maintain full speed even in rough weather better than its predecessors did in smooth. No. 98 was launched complete and ready to begin her trials; No. 99 has since been launched; the remaining boats will be numbered 107 and 108. All four boats are to be delivered and tried by September next. Five boats are in the new programme.

The Royal Yacht. Reference was made in last year's *Annual* to the accident which occurred while undocking the new royal yacht at Pembroke, and to her having been sent to Portsmouth to undergo alteration. She underwent her trials in September with highly satisfactory results: not only did the machinery work smoothly, but the speed reached the maximum of expectation, the coal consumption was moderate, and the sea-keeping qualities of the vessel proved to be all that could be wished. In a heavy sea and three-fourths of a gale the stability of the ship under trying conditions was fully tested. In running before the wind she was perfectly steady; against the wind she pitched, but her movement synchronised with the action of the sea; with the wind abeam she rolled, but, even in turning, the heel did not exceed ten degrees, and the time taken in rolling from one side to the other was about the average of a well-found warship. The mean results of the forty-eight hours' run were as follows:—I.H.P. 5142; coal consumption per hour, 10,241·3 lbs.; consumption per unit of power per hour, 1·94 lbs.; speed, 16·3 knots. At a second trial with 7625 I.H.P., the coal consumption worked out at 1·94 lbs. per unit of power per hour, the mean speed being 18·3 knots. A third run of forty-eight hours at 7649 I.H.P. gave a coal consumption of 1·87 lbs. per I.H.P. per hour, and a speed of 18·47 knots. The final trial of eight hours, with full speed, was made in the Channel, with the following results: The yacht drew 18 ft. 2 in. forward, and 20 ft. 1 in. aft. She had 306 lbs. of steam in her boilers. The vacuum was 25·2 in. starboard and 25·3 in. port, the revolutions being 147·2 starboard and 147·6 port. The I.H.P. was 5620 starboard, and 5678 port; the collective I.H.P. being 11,298. The mean air pressure was ·6 in., and the mean of four runs over the measured course gave a speed of 20·53 knots. These trials have been of special interest, as, after the unfortunate mishap at Pembroke, doubts arose as to the stability of the yacht. Such doubts have been entirely dispelled by the behaviour of the vessel in two gales. The engines and boilers have given as much satisfaction as the hull, and the trials have been a complete success.

Submarine boats.

The most interesting item in the new programme is five submarine boats, which were ordered from Messrs. Vickers, Son, and Maxim in 1900, when work was at once commenced upon them. The secret of their construction was kept for some time, and when it did leak out did not obtain universal credence. In the First Lord's memorandum, 1901-1902, it is stated that the first of them will be delivered next autumn, and the following explanatory paragraph is added :—"What the future value of these boats may be in naval warfare can only be a matter of conjecture. The experiments with these boats will assist the Admiralty in assessing their true value. The question of their employment must be studied, and all developments in their mechanism carefully watched by this country."

The dimensions of the boats are 63 ft. 4 in. length over all, 11 ft. 9 in. beam, and 120 tons displacement submerged. They will be provided with means of expelling torpedoes either with the boat stationary, during the run on the surface, or submerged at full speed. The armament consists of one torpedo expulsion tube situated at the extreme forward end of the vessel, opening outward 2 ft. below the light water-line. Interlocking safety devices are employed to prevent accident while operating valves &c. on the expulsion of the torpedo. The general construction of the vessels is such that all portions of the exterior of the hull are free from projections of a nature to be entangled by ropes or other obstacles when submerged, and the lines of the vessel are specially designed to minimize resistance for surface cruising. The propulsion of the vessel on the surface is effected by a gasoline type of main engine, which is supplied with a sufficient amount of fuel for a run of about 400 knots with a maximum speed of about 9 knots. An electric main motor is provided for giving the vessel a speed of 7 knots when submerged. It is worked by storage batteries having a capacity which will admit of a speed of 7 knots for a four hours' submerged run. Gearing is provided to allow for the charging of the battery, driving the propeller from the main engine, or moving the engine from the main motor, these combinations being effected through clutches which are operated as desired. The lighting of the vessel is effected by portable incandescent electric lamps. The ballasting system consists of apparatus and means for quickly changing the vessel from light to a diving condition and for keeping her displacement constant in different waters. Also for keeping the longitudinal trim under the control of the navigator, and for compensating for the variable weights installed or expended from time to time, such as discharging torpedoes, &c. The air supply and ventilation are secured by compressed air stored on board the vessel, the gasoline vapours

from the engines being carefully excluded by suitable arrangements. Safety valves are arranged to relieve any excess of pressure in the vessel over that of the atmosphere. The steering and diving engines are provided with automatic means of moving the rudders to the desired positions to prevent the vessel from inclining to excessive angles during diving or rising, and to keep the depth of submergence constant, as well also as to bring the vessel to a horizontal position at the required depth, and to prevent diving to excessive depths. Steering and diving can be executed by hand gear if desired. The compasses are compensated and adjusted so that the boat can be steered with equal accuracy submerged as on the surface. The type is that which has been invented by Mr. Holland, and has been tried in America.

"Appendages" of the Fleet.

The provision of fleet auxiliaries or "appendages" has excited considerable discussion during the past year and has been under the consideration of the Admiralty. These auxiliaries are of six classes. Repair ships, one of which is now being fitted up. Torpedo depôt ships, of which we have two in existence, the Vulcan and Hecla. For this purpose it is believed to be more economical and more conducive to efficiency to purchase ships of the mercantile marine than to build them. Fleet colliers: There are three of these vessels now under trial, and in regard to them it is also thought that, on the whole, using private enterprise will give a better result than Government building. Distilling ships: One of these vessels has been purchased and another is to be obtained, but the trial made with two which were hired for the purpose during last year's manœuvres was not very satisfactory. Telegraph ships: The official view on this class was reported in last year's *Annual*. Hospital ships: It is expected that the Maine will be secured for service as a hospital ship in the Mediterranean during the ensuing summer.

Removals from the Navy List.

A number of old and obsolete vessels which have long encumbered the list of the Navy have now been removed. The list includes the following ironclads:—Triumph, Invincible, Audacious, Northumberland, Agincourt, Achilles, Minotaur, Black Prince, Warrior, Belleisle, Hydra, Neptune, Swiftsure, Iron Duke, Nelson, and Northampton; and the following unarmoured ships:—Pelican, sloop; Raleigh, second-class cruiser; Rapid, third-class cruiser; Satellite, third-class cruiser; and Volage, second-class cruiser. Two ships also have been wrecked during 1890–91, but in each case only one life was lost. The river gunboat Sandpiper was sunk at Hong Kong in a typhoon on November 10 last. She has since been raised and may be made serviceable. The Sybille, second-class cruiser, went ashore at Lambert's Bay in Cape Colony on January 16 last

and became a total wreck. The Hind, a small coastguard cruiser, was also lost on the East Coast of England during the year.

Personnel numbers.

The total number of officers, seamen, and boys, coastguard and Royal Marines proposed for the year 1901–1902 is 118,635, being an increase of 3745. The additions proposed are made up of 287 officers, 1150 seamen, 500 stokers, 398 miscellaneous ratings, 310 artisans, including 100 electricians, 1000 Marines, and 100 apprentices (shipwrights and coopers). The rating of electrician is a new one, and it is hoped to raise a hundred this year, and a hundred more subsequently. The increase in electrical departments has necessitated this step; they will be rated as chief petty officers, assistants to the torpedo lieutenants in connection with the large amount of electrical gear those officers have to superintend in the ships. Mr. Arnold-Forster, referring to the proposed increase in the *personnel*, made the following statement in his speech as Secretary of the Admiralty on March 18 of the total available resources which it was hoped to have ready for manning the fleet in case of war:—Upon the active list, 118,625; in the Royal Naval Reserve, 28,650; and in the Royal Fleet Reserve, 7300—giving a total of 154,575.

The Royal Fleet Reserve.

The Royal Fleet Reserve is a new force, to consist partly of men who have served in the Navy or in the Royal Marines, but who have left without taking pensions; this is called Class B; and partly of men who have been pensioned—this is Class A. The seamen pensioner reserve will be superseded eventually by the new Royal Fleet Reserve, but the present Royal Naval Reserve is not affected. The first entries in the Fleet Reserve were made on March 1, 1901, and it is hoped to eventually raise the numbers in Class B to 15,000. The men in this new reserve will undergo periodical drill—for a week every year, or a fortnight every second year, at their option. A scale of pay and victualling is fixed, and clothing will be provided free. The men in Class B receive a retaining fee of sixpence a day from the date of enrolment, so long as they abide by the conditions of their engagement. They can be called out for service by Royal Proclamation up to the age of fifty-five, receiving a war retainer when called up. Additional pensions are granted to men in Class A at the age of fifty, and a pension of £12 a year to men in Class B at fifty-five years of age.

Royal Naval Reserve.

Owing to a falling off in the numbers of seamen in the Royal Naval Reserve and in those embarking for training, it has been decided to readjust the pay and to reduce the period of training from six to three months and the total sea service from fifteen months to nine months. A readjustment of the system of instruction is to be made in order, as far as possible, to neutralize the loss of time under training. In

order further to facilitate mobilization an Act of Parliament has been passed enabling the Admiralty, when the Royal Naval Reserve is called up for service, to limit the numbers called out to such as may from time to time appear desirable.

Colonial Reserve.

A branch of the Royal Naval Reserve has been established in the North American Colonies, and fifty seamen from Newfoundland have been embarked in ships on that station for six months' training.

Royal Marines.

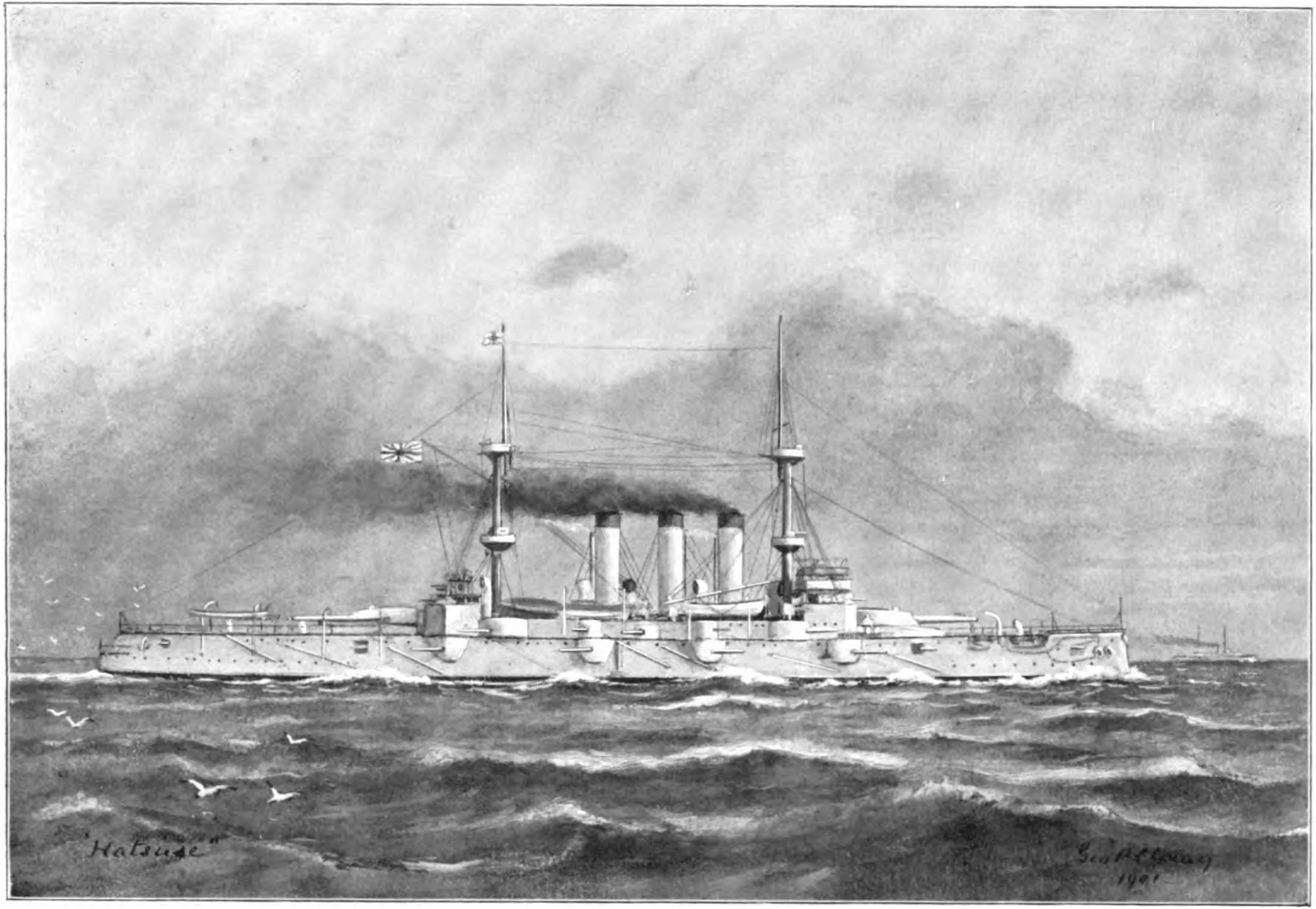
It is proposed to create a reserve of officers of the Royal Marines, and all officers who voluntarily retire will be liable to serve in this reserve, those already on the retired list or who may be retired compulsorily having the option of joining if under fifty years of age. During the year 1900 the number of recruits raised for the Marine Artillery was 616 and for the Marine Infantry 2014—a total of 2630. During the twelve months there was a wastage of 2165, but more than half of this number were men whose time had expired or who were pensioned, purchased out, or had been invalided. Most of these will be eligible for entry in the new Fleet Reserve, and, it is anticipated, will join it.

Naval training.

The recommendations of a committee on the training and examination of junior officers have been embodied in the King's regulations. Special encouragement is given to the better study of foreign languages; the seamanship examination has been revised; promotion to the rank of lieutenant will not in future depend only upon success in examinations, but a certificate will be required to be obtained by every sub-lieutenant from his commanding officer after six months' service in a ship of war at sea, as to his fitness to take charge of a watch at sea, and to perform efficiently his other duties as a lieutenant. A naval strategy course has been begun at Greenwich for the benefit of the senior officers, and is being conducted by the captain of the college. The Council of Naval Education has been directed to examine the Greenwich course in order to ascertain whether the matter and period of study of the gunnery and torpedo lieutenants is that most adapted to the efficiency of the service. Several changes have been made in the training of the seamen and stokers with a view to increased efficiency, and in the First Lord's memorandum it is stated, "There is no doubt but that the standard of proficiency in gunnery is steadily rising in the Navy."

CHAS. N. ROBINSON.

[The information in this chapter is brought up to the end of March, 1901, and where "the present time" is mentioned, that month is referred to.]



"HATSUSE."

JAPANESE FIRST-CLASS BATTLESHIP.

CHAPTER III.

THE PROGRESS OF FOREIGN NAVIES.

THE adoption by certain Continental Powers of extensive shipbuilding programmes, covering periods of years, which was referred to in the *Annual* last year, is still the most considerable feature to be recorded here. The French and German programmes, which were described in detail, and are alluded to below, have now received the sanction of the legislatures of the respective countries. It has to be noted also that shipbuilding work in Russia is active at all the yards, in prosecution of the programme of expansion. In the United States, again, the new policy adopted has inevitably entailed a rapid increase of the fleet, and the outlay upon new construction has never been so great as at the present time. In the Far East the Japanese have now completed, or have in hand, nearly all the ships included in their extensive shipbuilding programme, but their further intentions have not been disclosed. No ruling features in shipbuilding during the past year seem to call for special note in this place, but it may be said that, while at one end of the scale foreign Powers seem to be tending towards larger displacements in battleships, there is, at the other, everywhere a special interest in the development of submarine or submersible boats, due in part to the success which is reported to have attended recent French trials of these engines of war, and partly to the enterprise shown by the United States in undertaking the building of a flotilla. The decision of the British Admiralty to build certain vessels of this class has caused some attention to be devoted to foreign progress in submarine navigation in what follows.

FRANCE.

The ship building programme.

The principal work of the year 1900 was the elaboration of that programme for the augmentation of the Fleet, which provides for the building, before January 1, 1907, of six battleships of 14,865 tons, five armoured cruisers of 12,416 tons, twenty-eight destroyers of 305 tons, and a number, not yet decided upon, of sea-going and submarine torpedo boats. It is stated, however, that there will be about 112 of the former and about twenty-six of the latter. The Bill embodying the programme was presented to the Chamber in

February, 1900, and was reported upon favourably by M. Godin. It was then laid before the Senate, and a report was presented in November by M. Fleury-Ravarin, some of whose remarks in support of the Ministerial programme for the building of large battleships deserve to be cited. He pointed out that the naval expenditure had been heavy, and had led many to ask if there did not exist a more economical means of making war than that which consists in opposing to certain ships others of like character. Hence the *guerre de course* had exercised a fascination for many minds. But M. Fleury-Ravarin told the French Parliament that it has never brought an enemy to submission, and that in the existing conditions of naval warfare it is costly, while speed, its essential element, is, of all elements of strength at sea, the most elusive. Moreover, the organization of the *guerre de course* requires many naval bases, so that, not only is it more costly in the beginning, but it demands greater charges for maintenance. For these reasons, he said, this system of warfare cannot be raised to a method; it must remain an accessory. "If we are now asked what the fighting navy should really be, we must say that it should be capable of fighting upon the high seas with the navies of rival nations, and that it is the business of the technical boards of the Navy to indicate the nature and composition of the fleet required for the purpose. It is for the Parliament to decide if we shall be content with a modest defensive navy, which would be unable, as we cannot repeat too often, to do more than delay defeat in case of war, and which would be of little weight in the balance in time of peace, or whether, on the other hand, France is resolved to enforce her position as a Great Power, and to make the heavy but remunerative sacrifices necessary to give weight to her voice in the councils of Europe, thus attracting to herself commerce and riches, and spreading throughout the world her influence and her traditional ideal of justice and generosity."

The Chamber had adopted the programme, and had augmented the vote by fifty million francs, to be devoted to the building of torpedo craft, and the plan thus modified was voted by the Senate on December 7, 1900. Considerable opposition had been raised to the building of the large battleships, but M. de Lanessan, Minister of Marine, in the course of the discussion, explained the grounds of the Government policy in a manner that was generally thought conclusive. He spoke of the short range of the torpedo and the long range of the gun, and deduced from the conditions the necessity for two classes of vessels—torpedo craft and battleships and armoured cruisers. He then explained that, in order that the gun should be given its full value, it was essential that the platform

should be stable, a vessel of considerable dimensions thus being called for. It was possible upon such a platform to place many powerful guns, but a necessary consequence was that these should be protected, and hence came the need for heavy armouring. In short, the two qualities of offence and defence were indissoluble, but they were not the only qualities called for; speed and range of action were also necessary, and these again led inevitably to the heavy battleship. These views, though diametrically opposed to those which have latterly exercised a considerable hold upon French naval opinion, were finally adopted by the Legislature.

The following are the vessels which were added to the French Navy during the year 1900: the battleship Saint Louis; the cruisers Guichen, D'Estrées, and Infernet; the gunboats Décidée, Zélée, Argus, and Vigilante (the last two built by Messrs. Thornycroft, at Chiswick); the destroyers Fauconneau, Espingole, Yatagan, and the unfortunate Framée (the disaster to which is described below); several sea-going torpedo boats, and the submarine boats Morse and Narval. Vessels completed.

The vessels under trial have not been numerous. The battleship Iéna was commissioned towards the end of 1900 for her trials, which are still in progress. Many difficulties have occurred. Early in February, 1901, the engines worked up to 12,500 I.H.P. during four hours, and with 15,000 I.H.P. and 120 revolutions the speed was over 17 knots, but there was some heating, and the vibration was described as unbearable. The maximum I.H.P. at the trials should be 15,500 and the revolutions 125. Trials. Iéna.

The battleship Hoche, one of the vessels that have been undergoing transformation, was under trial in August, when satisfactory results were attained. With 10,800 I.H.P., and 86 revolutions, the speed was 16 knots. The coal consumption has been reduced, for whereas at the date of the former trial, with the normal coal supply of 610 tons, the ship's range of action was 803 miles, it has now been raised to 1,292 miles. She has received Belleville boilers, and the trim of the vessel has been slightly changed. Much weight has also been taken out of her by reducing the superstructure and making changes in the secondary armament, so that she now floats at the intended water-line and her side armour is not submerged. Some particulars of the changes introduced in the older French ships will be found below. Hoche.

Further preliminary trials of the so-called commerce destroyer (*cf. Annual*, 1900, p. 25) Châteaurenault took place at La Seyne, with satisfaction, on August 8. With 14,400 I.H.P. and 111 revolutions she maintained, for 20 hours, a mean of 21 knots, Châteaurenault.

while with 18,000 I.H.P. and 120 revolutions the mean on a two hours' run was 22·697 knots. It was therefore believed that with her full 23,000 I.H.P. she would easily exceed her contract of 23 knots. The coal consumption was satisfactory, the average during the second series of trials being one-eighth less than the contract for the first series, when the power to be developed was less. The trials were continued in October. Great vibration had resulted when the engines were working at high pressure, but some changes had been introduced, and with the engines working up to 120 revolutions, the conditions were considered satisfactory, but the trials were not concluded.

Infernet. The third-class cruiser Infernet steamed at 21 knots, with 8,625 I.H.P., the contract being 20·5 knots, with 8,500 I.H.P.

Ships launched. The vessels which took the water in 1900 were four armoured cruisers—the Dupleix at Rochefort, the Montcalm at Toulon, the Gloire at Lorient, and the Marseillaise at Brest; the four destroyers mentioned above as completed, with the Pique and Epée at Havre, and the Pertuisane and Escopette at Rochefort, as well as several first-class torpedo boats. The four cruisers named are representative of the progressive variation of the same type described in the *Annual* last year (pp. 28, 29). It may be enough to add here that the Dupleix displaces 7,700 tons and has a principal armament of ten 6·4-in. guns; the Montcalm, 9,517 tons, with two 7·6-in. guns; the Gloire, 10,000 tons, with the same principal armament, but with an increase in the secondary guns; and the Marseillaise, 10,014 tons, with the same armament, but slightly better protection. The Desaix, a sister of the Dupleix, was launched at St. Nazaire in March, 1901.

New ships. Others of the same classes are in hand, and two of a still stronger type, the Léon Gambetta (Brest) and Jules Ferry (Cherbourg) have been laid down. The latter will be the largest vessel ever built at Cherbourg. She will displace nearly 12,500 tons and have a speed of 21 knots or more. The general characteristics of the still larger new armoured cruisers were described in the *Annual* last year, as also of the battleships of 14,865 tons, and full descriptions are not yet accessible. A list of the ships to be laid down in 1901 will be found below.

Destroyers and torpedo boats. The destroyer Yatagan, constructed at Nantes by the Chantiers de la Loire, which is provided with four Normand water-tube boilers, and has a contract speed of 26 knots, attained 25½ knots without using her full power, and with complete satisfaction. She has been passed into the service and commissioned. The Pique, launched on March 31, 1900, at Graville, near Havre, by the Forges et Chantiers de la Méditerranée, is of the Durandal type modified, and resembles

the Fauconneau. The Epée, also constructed at Havre, is of the same type. Many of these boats have been under trial during the year. The sea-going boats Audacieux and Trombe, completed at Nantes, deserve to be noted because of the fact that they are armoured over the engine and boiler-room spaces with thin plates of nickel steel. The former steamed on her full power two hours' trial at 26·2 knots, the contract being 26 knots. The Trombe struck upon a rock during one of her runs near Port Melin, and was seriously damaged, repairs to the extent of about £4,000 being necessary. The Lance and Salve have been put in hand to receive water-tube boilers of the Normand type, and it is hoped that they may now attain their reputed speed of 19 knots. The Lansquenet, which has never attained her intended speed, has been struck off the list.

Mobile defences.

The organisation for the torpedo boats of the mobile defences of the coasts was explained by M. Fleury-Ravarin in his report upon the estimates. The chief centres are both strategic and administrative, and offer to torpedo boats at all times a safe refuge, with complete means of repair, and barracks for their men. The station centres have neither boats nor *personnel* in permanence, but will offer the same facilities (though on a smaller scale) as the principal centres in war time; while the refuge posts will be able to supply torpedoes, and to make small repairs, besides furnishing stores; and smaller refuge posts for temporary shelter will furnish water, coal, and provisions. The reporter stated that in 1900 and 1901 four destroyers (the Pique, Epée, Pertuisane, and Escopette), ten sea-going torpedo boats, eighteen first-class boats, six submarines, and two submersibles would be added to the Fleet.

Submarine boats.

In the *Annual* last year a description was given of the submersible boat Narval (page 30). Considerable attention has been attracted during the year to the experiments which have been made with this vessel and the submarine boats Morse and Gustave Zédé.

Gustave Zédé.

The following account is given by the *Petit Havre* of a visit paid by the Minister of Marine to the latter at the end of October: "The Minister went on board from a steam launch, and was accompanied by M. Cuvinot, Admiral Bienaimé, and some other officers. The manhole was then closed and the vessel submerged, the operation occupying nine minutes, but it was said that it could be performed much more quickly when the boat was in movement. The submersion left visible a flag at each end and the tube of the periscope in the centre. The range of the periscope was very limited, but sufficient for a man with a practised eye familiar with the surroundings. The commander, Lieutenant Jobard, took his craft out of the harbour into the open, and a steam launch followed close in her wake, the

submarine with her companion making the round of the warships lying in the roads. On her way she discharged one torpedo, which did not go straight, but this was stated to have been the fault of the torpedo and to have had nothing to do with its discharge. When near the Charlemagne the boat emerged and the passengers went on board the battleship. They had found the supply of oxygen in the submerged boat scarcely sufficient for their needs. The boat was kept at a uniform depth throughout the run, her speed being 9 knots. There was no rolling or pitching. The Minister expressed himself satisfied with the performance. He was especially pleased that it was possible to discharge a torpedo from the vessel while she was in motion." M. Loubet inspected the boat in April, 1901.

Narval. Morse.

Early in January, 1901, M. de Lanessan, accompanied by General André, Minister of War, proceeded to Cherbourg in order to take part in the trials of the submersible Narval and the Morse, which is an improved Zédé, and a somewhat sensational account of the incidents was given in the *Figaro* by M. Gaston Calmette, a journalist who accompanied General André and Dr. Vincent, of the French Navy, in the Morse. The following is his report of his impressions: "The plunge is so gentle that in the perfect silence of the waters one does not perceive the process of descent, and there is only an instrument capable of indicating, by a needle, the depth to which the Morse is penetrating. The vessel is advancing while at the same time it descends, but there is no sensation of either advance or roll. As to respiration, it is as perfect as in any room. M. de Lanessan, who since entering office has ordered eight more submarine vessels, has concerned himself with the question as a medical man also, and, thanks to the labours of a commission formed by him, the difficulty of respiration is entirely solved. The crew can remain under water sixteen hours without the slightest strain. Our excursion on this occasion lasted scarcely two hours. Towards noon, by means of the mysterious periscope, which, always invisible, floats on the surface and brings to the vessel below a reflection of all that passes up above, the captain shows us the Narval, which has just emerged with its two flags near the old battery Imprenable. From the depths in which we are sailing we watch its slightest manœuvres until the admiral's flag, waving on the top of a fort, reminds us that it is time to return."

Meanwhile the Minister of Marine had been making a trip, apparently with perfect success, in the Narval, and General André joined him when the Morse came to the surface. The very great attention which has been paid to the subject of submarine navigation since these trials will lend interest to the following abstract of a very

judicial article upon the subject by M. Rousseau in the *Moniteur de la Flotte*:—

Mr. Rousseau says that the trials did not throw any new light upon these engines of war, but that they had the merit of bringing the two types of boats into direct comparison, and that the opinion of officers, who had been in command of them, was unanimous. They all indicated their preference for the submarine boat properly so called, having evidently some distrust of the submersible. M. Rousseau, however, points out that the Morse represents a type of boat more or less established, and that the submersible Narval is of a new class altogether, and insists that the trials must not be interrupted of a class of boats which will have the advantage of being offensive. He has been on board the Morse, and says that she navigates with perfect ease below water, that those in her are able to discern by means of the periscope what is going on upon the surface, and that torpedoes are discharged with an accuracy and certainty which might be the envy of officers of ordinary torpedo boats. It asserts that the periscope can be employed up to a depth of about 20 ft. below the surface, and, according to M. Rousseau, it is quite adequate to prevent collisions, and, being turned round, enables those below to scan the whole horizon. It has been suggested that the instrument would be valueless except in smooth water, but the writer cited asserts that, during the Cherbourg experiments, the sea was very rough, and that the appliance gave, nevertheless, a very clear view. At a greater depth than 20 ft. the course of the Morse is directed by the compass. The plunge is effected by suppressing her floatability, by admitting water into special chambers, and there is equilibrium, so that the descent is made in the horizontal position, and the required level is maintained by lateral wings or rudders, to the movement of which the boat is very sensitive. The class of boat thus described is available purely for local defences, but the Narval, the system of which is described by M. Rousseau (his account not differing from that given in the *Annual*, 1900), could be employed in offensive operations. He says that the advantages of the submersible system would be incontestable, but, that certain problems have arisen, of which the solution has not yet been altogether realised. Larger water chambers and more powerful pumps are required for the plunging and raising of the boat. The steam not used during surface navigation must be condensed. These difficulties, combined with the necessity of coupling the electric mechanism with the driving apparatus, make it impossible to plunge the boat within less than seventeen or eighteen minutes. The period, he believes, will be reduced to ten minutes in the Silure, Triton, Sirène, and Espadon, but will still be too long, and in an actual encounter would leave the boat helpless before her adversary. He thinks, however, that the type of the submersible is perfectible, and that the difficulties will be overcome.

Visual apparatus for submerged boats.

The following account of the optical arrangements of the Zédé has been given by a French engineer in the *Naval and Military Record*: "The Gustave Zédé possesses an optical tube and a periscope, of which the chief dimensions are as follows—outer diameter 364 millimètres (about 14 inches); distance from the image to the emerged part of the apparatus, 1 mètre (39 inches); total field 27 degrees, of which 20 degrees are above and 7 degrees below the horizon; angle under which the upper part of the point of convergence of the rays can be seen 3 degrees; reduction 1-9th. The image obtained was examined by a rather complicated process by means of an eye-glass; the results obtained were very poor. This carefully-studied and precise periscope was constructed by the firm of Sautter-Harlé, but it did not answer its purpose. It nevertheless still figures in the Gustave Zédé."

In a book entitled "La Navigation Sous-Marine," by M. Maurice Gaget (Paris, 1901), is an account of the various devices which have been employed in France to give a measure of surface vision to submerged boats. The first apparatus was the optic tube, or

"prismoscope," proposed by Major Daudenard, which was based upon the principle of reflection, two prisms being placed one above the other in such a way that their reflecting surfaces were parallel, and inclined at an angle of 45° to the horizontal plane. These prisms were connected by a rigid vertical tube, and a clear vision was given, but with restricted field, and, owing to the difficulties set up when it was attempted to make a revolution upon its axis, the apparatus proved unsuccessful. The "periscope" is a later invention, due to Commandant Mangin, and perfected by Colonel Laussedat. Its effect rests upon the well-known and characteristic properties of the parabola, the arc of the parabola being curved about a vertical axis, and therefore reflecting the panoramic image to its focus. M. Gaget says that great difficulty arises from the reduction of objects varying with the distance from the mirror, the panoramic picture being thus distorted, and not enabling the relative distances of floating objects to be estimated. He accordingly describes the apparatus as presenting a phantastic panorama, and as being an illusory guide to the navigator. Light is also sacrificed by the method of reflection, and, although some elaborate instruments of the class have been constructed, the apparatus, according to M. Gaget, is almost valueless. He states that another means of indirect vision has been devised by M. Garnier, but details concerning it have not been disclosed. M. Gaget also describes at length, and in technical detail, an apparatus for panoramic vision which he has himself designed, and which he puts forward for experiment.

Three submarines—Farfadet (Rochefort), and Algérien and Français (Cherbourg)—have been recently launched, and the two last named have been under trial.

Vessels reconstructed.

Allusion has been made above to the modifications which have been introduced in the Hoche, and the following particulars of changes in the armament may be added. On each side there are now two of the twelve 5·5-in. Q.F., placed near the bases of the lateral turrets, with which they form groups or sections. Of the eight other guns of this calibre four are disposed further forward and four aft, and are arranged on two levels, the lowest being that of the battery; but the forward guns on this level could not be fought, it is believed, in bad weather, notwithstanding that the ship has more freeboard than before. The ship has also four 2·5-in. guns on the upper deck, and there is now only one fighting mast.

The Amiral Duperré is to be put in hand this year for reconstruction, at a cost of about £60,000, and will receive new boilers, and undergo general repairs to her machinery, while the central turret for the 13·3-in. gun will be replaced by two redoubts for 6·4-in. guns.

The Neptune is also to be put in hand, and will receive Belleville boilers, and have her superstructure cut down. The total cost will be about £62,000. The Dévastation approaches completion. The 12·5-in. guns have been replaced by four of 10·8-in. calibre, and the eight old guns of the latter calibre on the upper deck have been disembarked and replaced by two of 9·4-in. and four of 3·9-in. Belleville boilers have been supplied, and the engines have been altered to the triple-expansion type. The reconstruction of the coast-defence ironclads Indomptable and Caïman is to be completed this year.

A serious disaster occurred in August during the return of the Mediterranean squadron to Toulon after the manœuvres in the Channel. The squadron was steaming in line ahead, 70 miles to the south-east of Cape St. Vincent, when, about midnight, the new destroyer Framée, under command of Lieut. de Mauduit-Duplessis, was directed to approach the flagship Brennus to receive an order. Owing to circumstances which have never been fully explained, but apparently through the misunderstanding of an order, or mis-direction, the boat came into collision with the flagship, and in a few minutes disappeared. There perished with her the officer in command, Lieut. Epaillard, and nearly the whole of her company, and the catastrophe aroused universal sympathy. Disasters.

On the night of August 31 the sea-going torpedo boat Bouët-Willaumez ran on a rock near Bréhat, and sank in 10 fathoms of water, the crew being saved by torpedo boat No. 108.

The transport Caravane, 2,065 tons, was lost in the Japanese Inland Sea on October 23, through collision at night with the Japanese steamship Yamaguchi Maru. There was excellent discipline on board. One officer perished.

The vessels ordered, or in construction at the different ports, at the end of 1900, were as follows—Havre: the destroyers Arquebuse, Arbalète, Mousquet, Javeline, Sagaïe, Epieu, Harpon, and Fronde, all of the type of the Fauconneau, and to be delivered in 1903. Also the sea-going torpedo boats Simoun and Typhon; the first-class boats Nos. 243 and 253 to 257, and the Libellule, a boat with turbine motor. Cherbourg: Henri IV., battleship, which had her armament, but was awaiting her boilers, and will not be ready for her trials until the summer; Jules Ferry, cruiser, the laying down of which had been retarded by a disastrous fire at the steam saw works; the submarines Français and Algérien, now under trial, and the Sirène, Triton, Silure, and Espadon; the coast-defence ship Requin, having nearly completed her transformation, and the Furieux, about to be put in hand; and, lastly, two first-class torpedo boats, Nos. 223 and 224. Brest: the battleship Suffren, well advanced and to be ready Vessels in hand.

for her trials at the end of the year; the armoured cruisers Marseillaise and Léon Gambetta; the battleship Dévastation, undergoing transformation; and the Amiral Duperré and Neptune, about to be transformed. Lorient: four cruisers—the Jurien de la Gravière, to be finished this year; the Gueydon, which may also be finished then; the Gloire, to be finished in the autumn of 1902; and the Condé, barely begun. Nantes and Saint Nazaire: the cruisers Desaix and Amiral Aube, the first since launched and the second not to be delivered until 1903. Rochefort: the cruiser Dupleix, to be finished October 1, 1902; the destroyers Pertuisane and Escopette, already launched, and to be followed this year, first by the Flamberge and Rapière, and then by the Sarbacane and Carabine, all of the Fauconneau type; Vaucluse, aviso-transport, on which work is suspended; the cruiser Davout, undergoing transformation; four submarines, the Farfadet, Korrigan, Gnome, and Lutin, the first nearly finished, and all to be ready this year. Bordeaux: Kléber, cruiser, to be finished 1903; Borée and Tramontane, sea-going torpedo boats, nearly finished; six first-class boats, Nos. 258 to 261, to be delivered the end of this or the beginning of next year, and Nos. 264 and 265 in 1902. Toulon: battleships Jeanne d'Arc, nearly finished, and Dupetit-Thouars, to be launched this year and finished next; Marceau, battleship, undergoing transformation. La Seyne: Montcalm, cruiser, to be finished in June; Sully, cruiser, to be ready in 1903. Châlon sur Saône (Creusot): first-class torpedo boats, Nos. 245 to 250 and 261 to 263. Saigon: torpedo boats, Nos. 244 and P 96, to be finished, one in 1902 and the other in 1903.

Vessels to be laid down.

The vessels to be laid down in 1901, in accordance with the programme described above, are two battleships, A 8 and A 10, one armoured cruiser, C 13 (the Victor Hugo, to be built at Toulon), ten destroyers, twenty submarines intermediate between the Gymnote (30 tons) and the Morse (146 tons), and twelve first-class torpedo boats. The dimensions of these, so far as they are known, will be found in the tables.

Naval bases.

In relation to the measure for improving and strengthening the naval bases, the *Army and Navy Gazette* has given the following particulars:—The Government proposal was voted by the Chamber, which increased it by a sum of nearly 29,000,000 francs, making a total of 196,871,000 francs, the chief additions being for the works at the Etang de Berre, in Corsica, and Algeria, and at Diego Suarez. On the other hand, the transfer of the Colonial troops to the War Department has enabled a large reduction to be made in the Naval Budget. At the Etang de Berre, the entrance passage at Port de Bouc is intended to be deepened to 23 ft., and to be about 100

yards wide, and the canal which unites Port de Bouc with Martigues is to have a depth of over 19 ft. and a width of nearly 100 ft. This canal is to be prolonged through Martigues by the Canal du Roi, giving an approach to the lake. This great inland water would thus form a perfect refuge and base for destroyers, torpedo boats and small cruisers. The works intended in Corsica are to be chiefly at Ajaccio, where there is to be a station for two divisions of torpedo boats—eighteen in all—as well as for submarine boats. The existing facilities are to be developed, a fresh area of land is to be secured, barracks are to be built, and the whole capabilities of the place are to be largely augmented. Two new signal stations will be established. Bonifacio is to be improved as a secondary station of the mobile defence, with facilities for recharging the accumulators of submarine boats; while Bastia is to be fitted to receive a division of torpedo boats, and to be provided with a floating dock; and shelter stations for torpedo craft are to be created at Calvi and the Ile Rousse. More considerable works are to be undertaken at Porto Vecchio, which is to be made a centre of the mobile defence, boats being placed in permanence there, with every facility for repair and the recharging of accumulators. In Algeria there is to be an expenditure of three and a half million francs. The docking facilities at Algiers are to be increased, and a station for eight torpedo boats and a division boat is to be created, with provision for submarine boats also. It is proposed to make Mers-el-Kebir a *point d'appui*, or secondary base, and a centre of torpedo-boats and submarine vessels, placed within striking distance of the course from Gibraltar to Malta. Stores for the fleet are to be erected there, and a sheltered harbour is to be formed for torpedo boats. At Oran and Bona it is intended to establish refitting basins, which may be used at any time, and will be of special value in case of war. In regard to Diego Suarez, it is intended to improve the facilities of the fort and to provide a refitting basin.

Considerable attention was directed to the French manœuvres, which took place in July, 1900, owing to the fact that the Mediterranean Squadron proceeded to the Channel, and engaged in operations with the Northern Squadron, the whole of the manœuvres being under the supreme direction of Vice-Admiral Gervais, who, as Admiral-in-Chief, hoisted his flag in the Bouvet. The Mediterranean Squadron was thus constituted:—battleships: Bouvet, Brennus (flag of Vice-Admiral Fournier), Charles Martel (flag of Rear-Admiral Roustan), Charlemagne, Gaulois, and Jauréguiberry; armoured cruisers: Chanzy, Latouche-Tréville and Pothuau (flag of Rear-Admiral Maréchal); protected cruisers: Cassard, Du Chayla, D'Assas, The manœuvres.

Linois, Lavoisier and Gallilée; two destroyers and four squadron torpedo boats. Attached to the fleet was the coast-defence squadron, comprising the Bouvines (flag of Rear-Admiral Mallarmé), Amiral Tréhouart, Jemmapes and Valmy, as well as the torpedo transport Foudre. The Northern Squadron consisted of the Masséna (flag of Vice-Admiral Ménard), Carnot, Amiral Baudin, Formidable (flag of Rear-Admiral Touchard), Amiral Duperré, and Redoubtable; the armoured cruisers Dupuy de Lôme and Bruix, the protected cruiser D'Estrées, five destroyers, and two torpedo boats.

The Mediterranean Squadron left Toulon on June 21st, and, after steam tactics and certain exercises, passed through the Straits of Gibraltar, and reached the neighbourhood of Quiberon on July 5th, and the combined fleet anchored in four lines in the bay. The meeting had taken place at daybreak on July 2nd, when the formation in four columns line ahead was assumed. One of the exercises was an attack by the squadron upon Forts Saint Julien and Riberen at Quiberon, these being subjected to a tremendous cannonade from the ships under the orders of Vice-Admiral Ménard, while Admiral Fournier made a similar attack upon the elevated forts which defend the port of Le Palais at Belle Ile. It is impossible to say what lessons could be learned from these operations, which were probably more an exercise for the officers and men than anything else. The evolutions were continued on subsequent days, and included a torpedo attack upon the squadron anchored at Morgat on the night of July 8th. The following was the theme: A naval force anchors off an enemy's coast in daylight, and the torpedo boats of the local defence are informed of its position; in order to protect itself the squadron is surrounded by picket boats at some little distance from the ships, while other vessels at a greater distance, circling round, make an illuminated ring by means of their searchlights. In this way it was hoped to discern the boats as they approached, and two attacks were repulsed. In the third attack, however, the Jauréguiberry and Charlemagne were torpedoed, but not until their assailants had been subjected to a destructive fire. The opinion was that the guard boats had been too numerous to give five or six assailants any real chance of success.

On July 9th the combined squadron proceeded to Brest, and Admiral Gervais conducted the somewhat delicate operation of entering the Goulet in three columns, followed by the cruisers. The passage is about 2,000 yards across, and is divided into two channels by a series of reefs stretching out from the Roche Mengam to the Fillettes. Two of the columns entered through the northern passage, and the third through the southern, and the whole of the

ships anchored together in the formation described in Brest harbour. The fleet had been at sea for ten days engaged in various evolutions, in steam tactics, and in scouting and fighting formations, and on several occasions had anchored, thus giving excellent training to the men. There were 41 vessels of all classes, and no mishap had occurred, except in the case of the Jemmapes, which had had a boiler trouble before leaving the Mediterranean. The Northern Squadron left Brest on the next morning, the 10th, and proceeded northward, the ships bombarding the batteries at Querqueville and at the Cherbourg Mole, but this again was only an exercise for those on board. On the 13th the combined squadron was in Cherbourg harbour, and on the 17th Admiral Gervais reviewed a body of seamen landed from the fleet. A naval review took place on July 19th, the President of the Republic visiting Cherbourg for the purpose. It was a brilliant ceremony and was the conclusion of the operations. The Mediterranean Squadron then returned to the south, and it was in the course of the cruise that the new destroyer Framée was lost, as is related above.

Although the operations were conducted on a large scale, it cannot be said that they threw any new light upon naval problems. No ambitious strategic schemes were laid down, and Admiral Gervais was content to put the fleet through a great many useful exercises, and doubtless the officers and men profited much by the various experiences. Nothing appears to have been disclosed in regard to the special steam tactics employed, but it is understood that certain methods employed in the Mediterranean by Admiral Fournier, apparently analogous to the "T.A." system of Sir George Tryon, have been introduced into the Northern Squadron.

GERMANY.

The Navy Act, 1900.

In the *Naval Annual* last year, Part IV., pp. 429–443, the Bill for the increase of the German fleet was given *in extenso*. The measure, as amended by the Budget Committee, and finally adopted on June 14, 1900, differs in some important respects from it. Whereas the first proposal of the Government was in form an amendment to the Navy Act of 1898 (the Sexennate), the new measure supersedes the earlier one by a fresh scheme which is really more in accordance with present official views. Its first clause fixes the future strength of the navy at two double squadrons, each consisting of a flagship and of two squadrons severally of eight battleships, eight large and twenty-four small cruisers for service with the fleets; three large and ten small cruisers for service on foreign stations; and a reserve

of four battleships and three large and four small cruisers. The Navy Act of 1898, as amended by the Government Bill, would have fixed the strength of the squadrons and their attached cruisers as is stated above, but would have provided for eight large and fifteen small cruisers for service on foreign stations, and a reserve of four battleships, and four large and six small cruisers.

The Centre Party, which was responsible for the changes made, thus met the wishes of the Government so far as the strength of the fleet in home waters was concerned, but reduced the number of ships intended to be provided for foreign service. A final paragraph was added, ensuring that the money required should be raised in a manner approved by the Centre Party, *i.e.*, by an increase of the stamp and certain customs duties. In the course of the debate Admiral Tirpitz, Secretary of State for the Navy, announced that the Government, though insisting upon the necessity of maintaining the number of ships on foreign stations, would agree to postpone the final settlement of the question.

Ships launched.

In the year 1900 seven vessels were launched—the battleship Kaiser Barbarossa at the Schichau Yard, Danzig, and the Wittelsbach at Wilhelmshaven; the armoured cruiser Prinz Heinrich at Kiel; and four third-class cruisers, the Amazone at the Germania Yard, Kiel; the Ariadne and Medusa at the Weser Yard, Bremen; and the Thetis at Danzig. All these classes were described in the *Annual* last year, pp. 36–37. Four battleships, one armoured cruiser, and a gunboat were in hand at the end of the year.

Types of the new battle-ships.

The new battleships are of three types, all marking distinct advances upon the Brandenburg class. The first of these developments is the "Kaiser" class, consisting of five ships, the Friedrich III., Wilhelm II., Wilhelm der Grosse, Karl der Grosse, and Barbarossa, all of which are now afloat. The Wilhelm der Grosse was to be completed in March, 1900. The second class is that to which the Wittelsbach (launched at Wilhelmshaven on July 3) belongs, as well as "D," "E," "F," and "G," which are respectively in hand at Danzig; the Germania Yard, Kiel; the Vulcan Yard, Stettin; and Wilhelmshaven, and are all expected to be launched in 1901. The chief difference between the two types consists in their larger displacement, greater engine power, and their defensive armour, the ships of the "Wittelsbach" class being plated with Krupp steel 9 in. thick amidships, tapering to 6 in., and with somewhat thicker plating of the same steel on the chief gun positions. As in all the modern German battleships, the heaviest guns have a calibre of 9·4 in., and have been described, though not with technical accuracy, as quick-firers. The two ships, "H" and "J," which

are to be laid down in 1901, will have a much more considerable armament than the other type, both in regard to calibre of the heavy guns and the number of the secondary and smaller armament, but full particulars are not known. All the new battleships are being fitted with a combination of cylindrical and Thornycroft-Schultz water-tube boilers.

The armoured cruiser "B," which is in hand at Kiel, is a sister of the Prinz Heinrich, but considerable changes have been introduced. She will have an armament of four 8·2-in. guns (instead of two of 9·4-in.) and ten 5·9-in., twelve 3·4-in. and ten 1·4-in. quick-firers. She will probably be launched in 1901. Armoured cruiser Prinz Heinrich.

Another third-class cruiser, "G," of the improved Gazelle type, being a sister of the Nymphe (which was at Spithead on the occasion of Queen Victoria's funeral) and of the four launched last year, is in hand at the Germania Yard, Kiel. Others of this small class will be laid down in accordance with the programme. The Niobe, of the same class, built at Bremen, has passed through her trials with perfect satisfaction. With 926 I.H.P. her speed was 11·1 knots, and it rose to 19·45 knots with 4,921 I.H.P., and finally, with forced draught of from 8,113 to 8,631 I.H.P., she steamed at 22 knots with 166·5 revolutions, the contract being 8,000 I.H.P. and 21·5 knots. The Thornycroft-Schultz boiler has been adopted for vessels of the class. Third-class cruisers.

The Schichau torpedo boats 90 and 91 have completed their trials, exceeding by 0·8 the contract speed of 25 knots. These two boats belong to a series of twelve, S90 to S101, which are being built by Herr Schichau. Not all are of the same type, some of the later numbers being destroyers of 350 tons. No. 100 and some others have been launched. The engines are of 6,000 I.H.P., intended for a speed of 26 knots, and the trials of No. 100 gave satisfaction. Torpedo vessels.

The coast defence armoured Hagen, which was one of the German vessels sent to Spithead for the late Queen's funeral, had just undergone a complete reconstruction. She belongs to the Siegfried class of vessels, which were all built for the purpose of local defence, their range of action being very restricted. The Hagen was cut in two, and a new section built in amidships, lengthening her to the extent of 27 ft. Her coal capacity was thus increased from 225 to 580 tons, and her four locomotive boilers have been replaced by eight Thornycroft water-tube boilers, giving her 5,250 I.H.P. and a speed of 15 knots. Reconstruction of the Hagen.

The armament has also been augmented and now consists of three 9·4-in., ten 3·4-in., and six 1·4 in. guns, as well as eight machine guns, while the torpedo armament now provides for 18-in.

torpedoes, and the above-water tube has been armoured. A further improvement has been the heavier plating with nickel steel (7 in.) of the conning tower, and instead of the signal mast there is an armoured fighting-mast. Provision has also been made for increasing the ship's company from 276 to 297. It is intended that the whole of the seven ships belonging to this type shall undergo a like transformation.

Loss of the Gneisenau

A serious disaster, unhappily attended by much loss of life, occurred through the loss of the training ship Gneisenau, at Malaga, on December 16. She was a full-rigged ship, but was fitted also for steam propulsion. She had on board 14 naval officers, including Captain Kretschmann in command, 49 cadets and 6 other officers, and about 380 men. The unfortunate ship was lying outside the harbour at Malaga, when a great storm arose, causing her to drag her anchors, and she was driven with much force against the Eastern Mole and completely wrecked. The officer in command was among those who went down with her. The disaster aroused great sympathy.

Kaiser Friedrich III.

The battleship Friedrich III. was damaged on the Adlergrund in April, 1901. Water-tight compartments were flooded and petroleum reservoirs broken open, the escaped oil taking fire and greatly imperilling the ship. The repairs will occupy many months

The Navy League.

The German Navy League is a most prosperous organisation which has exerted a great deal of influence during the campaign in favour of the Navy Act. In support of this agitation more than six million books and pamphlets were published at the expense of the League, while 3,000 lectures and addresses were delivered, followed by 600 more in the latter part of the year. So prosperous is the League that it has established a fund for the benefit of sailors and soldiers taking part in the Chinese Expedition, and has otherwise expended money for the advantage of the German Navy. At the annual meeting of the League in January, under the presidency of Prince zu Wied, it was announced that during the year 1900 the number of members had increased from 246,967 to 599,141, and the number of branches from 286 to 1010. Central committees had been established during the past year for Bavaria, Alsace-Lorraine, Saxe-Weimar, Lippe-Detmold, the principalities of Hohenzollern and Reuss (the younger line), the Duchies of Coburg and Gotha, and the Prussian provinces of Brandenburg and Posen. The organisation of the League now extends over the whole country, and there were only three small German States in which central committees had not been established, and in two of these local committees had already been formed.

New docks.

Great additions are being made to the docking accommodation at Kiel, and two immense dry docks at Wilhelmshaven have been

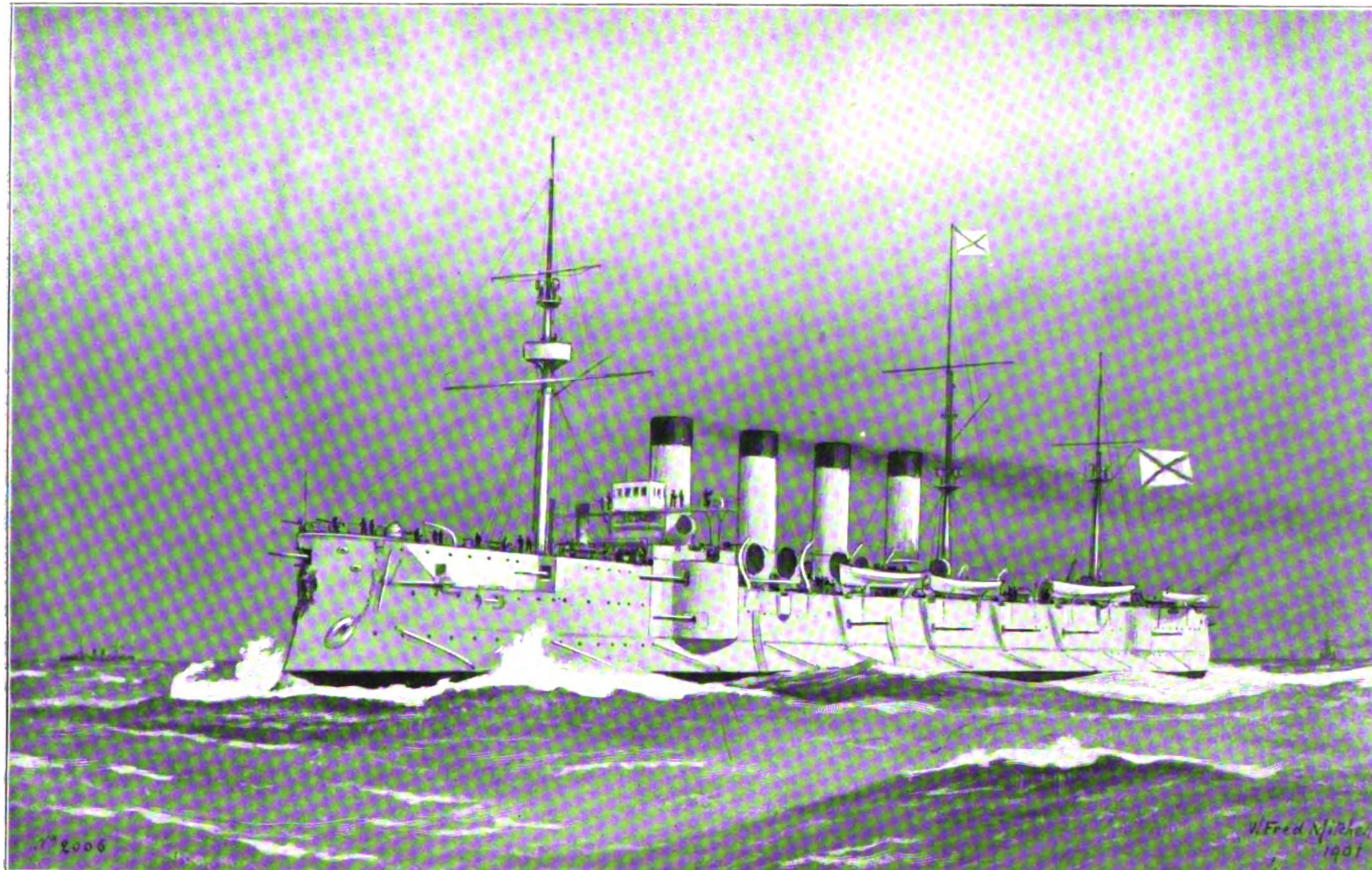
begun, which, it is estimated, will require five years to complete. The total outlay will be 12,000,000 marks, of which ten and a half millions will fall upon the Empire. The remainder is a contribution of the North-German Lloyd at Bremen, in consideration of the Navy foregoing the right to precedence over all vessels of the German Mercantile Marine as regards use of the company's dock at Bremerhaven, at present the largest of the kind on the Continent, a renunciation only to apply to times of peace. The preliminary works at Wilhelmshaven, for which 500,000 marks were granted by the Reichstag, have so far progressed that the task of excavation has commenced. Both docks will admit the largest German men-of-war, even if lying deep in the water, through the flooding of compartments, and will suffice for many years to come. Gigantic pumps will be able to empty these docks (two similar to which are under construction at Kiel) in two and a half hours.

The German manœuvres took place during August and September, 1900, in the North Sea and the Baltic. The fleet was organised as follows: First squadron (Vice-Admiral Hoffmann), the new battleships, Kaiser Wilhelm II. and Kaiser Friedrich III., and the older ships Sachsen and Württemberg. Second squadron (Rear-Admiral von Arnim): First division, the coast-defence armour-clads, Aegir, Odin and Heimdall; Second division (Rear-Admiral von Bodenhausen), the Hildebrand, Frithjof and Siegfried, of the same class. The cruisers were the Greif, Jagd, Blitz, and Pelikan in one group, and the Pfeil and Grille in another, and there were two torpedo flotillas, each in two divisions. The manœuvres lost something of their importance owing to the fact that many ships had been despatched to China, and the squadrons were particularly weak in the matter of cruisers. The operations began with inspections and drills, and after a day in Wilhelmshaven there were steam tactics and night torpedo attacks. It is reported that in the latter the assailants were several times successful, but whether reasonably so or not could not be determined without a better knowledge of the conditions than the information accessible makes possible. On August 23rd there were exercises at a mine-field, which was defended by boats manned by naval artillerists. Another event was an attack on Cuxhaven, which appears not to have been instructive. On August 25th the fleet left for the Baltic by way of the Skaw, where there was a torpedo attack unsuccessfully conducted. After coaling at Neufahrwasser, there were tactical exercises from September 3rd to September 8th, after which the squadrons proceeded to Swinemünde, where the officers took part in the military parade before the Emperor.

The manœuvres.

On September 10th and 11th there were further tactical exercises

at Stettin, and then three days were given up to the strategical scheme. Germany was supposed to be at war with a superior power, and a "Yellow" hostile fleet coming from the east designed to land troops on the island of Rügen, whilst Stettin and Swinemünde were to be attacked, and the sea defences of the latter place destroyed. It was the business of the German fleet to interrupt or prevent these operations on the part of "Yellow," and Vice-Admiral Hoffmann acted as umpire in the Kaiser Wilhelm II. "Yellow" had an advantage in the matter of strength; and on the morning of September 13th succeeded in forcing his way through the passage on the south side of Bornholm, with the loss of two ships, the Germans being unable to watch both sides of the island. He then sent on his transports to secure the landing, while he kept the pursuing German squadron at bay, disabling several of its cruisers. On nearing Rügen the "Yellow" leader ordered an attack on Sassnitz to secure the railway, while the Kaiser Friedrich III. and Frithjof, on the German side, attempted to prevent the landing, engaging four ships of the nominal value of the former. They were driven off damaged and with loss of speed, and the troops were successfully put on shore without further opposition. A great bombardment of Swinemünde took place on the next day, and two gunboats of the defenders, as well as the Odin, which attempted to join her friends outside, were put out of action. It is unnecessary to describe the operations further, but the following remarks by a correspondent of the *Times* may be quoted: "As in the previous year, the final operations involved a great deal of 'make-believe'; there is thus a certain air of unreality about them. The *maximum* speed for battleships was exceedingly low, and large cruisers were conspicuous by their absence. The German commander seems to have made no attempt to harass the enemy with his torpedo boats, even on the night of September 13th, and nothing seems to have deen done by the German cruisers to stop the transports when they had forced the passage. If the German fleet was so strong, as it must have been *ex hypothesi,* as to be able to watch both sides of the Bornholm, it is clear that a few cruisers might well have been kept back for this purpose. Again, the 'Yellow' fleet, even after losing two ships to the German three or four, cannot well have been so superior as to be able to risk an engagement with forts and fleet at once. The unreal element in the operations seems, on the whole, to have been too prominent for any lessons of great value to be drawn from them, at any rate by those who were not in a position to follow the strategy from inside."



"GROMOBOI,"

RUSSIAN FIRST-CLASS ARMOURED CRUISER.

Russia.

The year 1900, and the beginning of 1901, were remarkable for the large number of vessels which took the water. Four battleships were launched—the Retvisan at Philadelphia, the Pobieda at the Baltic yard, St. Petersburg, the Kniaz Potemkine Tavritchesky at Nikolaieff, and the Cesarevitch at La Seyne. The armoured cruiser Bayan was also launched at La Seyne, and of protected cruisers the Bogatyr at the Vulcan Yard, Stettin, the Aurora at Galerny Island, St. Petersburg, the Askold at the Germania Yard, Kiel, the Boyarin at Copenhagen, and the Novik at Elbing. The Retvisan was very fully described in the *Naval Annual*, 1899, and some particulars have also been given of the Pobieda and Potemkine classes. The *Kronstadtski Viestnik* states that the Pobieda, which was launched on May 24th, 1900, was begun on August 1, 1898, being thus nearly 22 months on the stocks. Her length over all is 434 ft. 3 in.; between perpendiculars, 401 ft. 3 in.; beam, 71 ft. 6 in.; mean draught, 25 ft. 3 in.; displacement, 12,674 tons; engines, 14,500 I.H.P.; speed, 18 knots; coal capacity, 2056 tons. Her armament is given in the tables. The following are later particulars of the Potemkine, which was begun on December 27, 1897, and was launched on October 29, 1900:—Displacement, 12,480 tons; length, 372 ft. 4 in.; beam, 72 ft. 10 in. draught, 27 ft.; armament, four 12-in., coupled in turrets, protected by 11¾ in. and 9¾ in. nickel steel, with an arc of fire of 270°; sixteen 6-in. Q.F. in the redoubt in pairs on double Canet mountings; four 4·7-in. Q.F.; and twenty others of smaller calibre; five torpedo tubes; two vertical triple-expansion engines, and fourteen Belleville boilers, developing 10,600 I.H.P., to give a speed of 17 knots; range of action, 4,000 miles at 10 knots. The side plating extends for two-thirds of the ship's length, and is from 10 in. to 9 in. thick, with transverse bulkheads fore and aft of the latter thickness, a citadel thus being formed, above which is the redoubt covered with 5 in. of steel.

Battleships launched.

Retvisan.

Pobieda.

Kniaz Potemkine

The Cesarevitch was launched at the Forges et Chantiers de la Méditerranée at La Seyne on February 23rd, 1901. She has been built from the designs of M. Lagane. The following are the principal particulars:—Displacement, 13,110 tons; length, 388 ft. 8 in.; beam, 76 ft. 2 in.; normal draught, 26 ft. 3 in. Protection is given by a complete belt of steel, 9·8 in. thick amidships at its upper edge and 6·6 in. at its lower edge, these measurements being reduced to about one-third the thickness at the bows and the stern. The side armour is to emerge 20 in. above the water-line, and to descend about 5 ft. below it. Further protection is afforded by steel plating 8·8 in. thick covering the space between the two armoured decks, which are

Cesarevitch.

at the levels of the upper edges of the two ranges of side armour. The principal and uppermost armoured deck is of nickel steel, 2·5 in. thick, while the lower one is merely for protection against splinters, but is curved downward at the sides to a depth of 23 ft. below the water line, there joining the structure of the hull. The armament comprises four 12-in. guns coupled in turrets fore and aft, the turrets being protected by 10 in. and 11 in. of steel. Twelve 6-in. Q.F. are also mounted in pairs in turrets covered with 6½ in. of steel, and there are twenty 3-in. Q.F., twenty Hotchkiss 1·8-in., six Hotchkiss 1·4-in., and two Baranovsky 2·5-in. guns for landing purposes. The torpedo armament comprises six tubes, of which two are submerged. The guns are so mounted that for bow and stern fire there are two 12-in. and eight 6-in. guns, and for broadside fire four 12-in., six 6-in., and one half the other guns. The whole of the ordnance is provided with electric gear for training, provided by MM. Savateur and De Lagalbe. Triple-expansion engines of 16,300 I.H.P. are to give a speed of 18 knots, and there are twenty Belleville boilers in two groups. The normal coal supply will be 900 tons, capable of being increased to 1350 tons. The ship was laid down in May, 1899, and is to be completed in September, 1902.

New battleships, Borodino, Alexander III., Orel.

Particulars were given of the battleships lately laid down—the Borodino, Imperator Alexander III., and Orel—in the *Annual* last year, and the following details concerning the first two are taken from the *Kronstadtski Viestnik.* They would indicate slight differences, but in view of the uncertainty existing, the tables have not been altered:—Borodino, begun May 26, 1899; length between perpendiculars, 397 ft.; beam, 76 ft.; displacement, 13,566 tons; engines, 16,300 I.H.P.; speed, 18 knots. The Imperator Alexander III.: begun September 5, 1899; length over all, 398 ft.; between perpendiculars, 376 ft.; beam, 76 ft.; mean draught, 26 ft.; displacement, 13,516 tons; engines, 15,800 I.H.P.; capacity of coal bunkers, 1250 tons; speed, 18 knots. She will probably be launched in the spring of 1901. The Kniaz Souvaroff, laid down at the Baltic Yard, St. Petersburg, is of the same type.

Kniaz Souvaroff.

Coast-defence ship, Admiral Boutakoff.

Some doubt has prevailed as to the characteristics of the coast-defence ship Admiral Boutakoff, which has, at length, been laid down at the New Admiralty Yard, St. Petersburg, and the following particulars have been taken from the *Kronstadtski Viestnik*:—Length, 341 ft. 6 in.; beam, 59 ft. 3 in.; draught, 17 ft. 3 in.; displacement, 5985 tons; engines, 7000 horse-power. According to this authority, she will carry six 8-in. and sixteen 1·85-in. guns; four Maxims; and four torpedo tubes, two above water and two submerged; but there is no certainty as to the actual armament intended, and the particulars

given in the tables are probably more trustworthy. The greatest thickness of her armour belt will be 7 in. Her coal supply will be sufficient to take her 750 miles at 16 knots, and 1400 miles at 8 knots.

The following are particulars of the armoured cruiser Bayan, launched at La Seyne on June 12, 1900. Length, 445 ft.; beam, 57 ft.; mean draught, 22 ft.; displacement, 7800 tons; protection, Krupp water-line armour, varying from 8 in. to 4 in. in thickness, and extending from the bows more than three-quarters of the ship's length; above this, 3 in. of steel from the bows, for a length of about 335 ft., protecting the lower deck, and rising to cover three redoubts, that amidships containing four 6-in. Q.F. at the angles and eight 3-in. Q.F., and those forward and aft each mounting two 6-in. Q.F. at the corners. The 3-in. guns are twenty in all, and there are seven 1·8-in. Q.F., while singly in turrets on the upper deck, forward and aft, are two 8-in. guns, with 7 in. protection and armoured ammunition hoists. Electric gear is provided for loading and training. There are two vertical engines of 16,500 I.H.P., the steam being developed by twenty-six Belleville boilers, and the intended speed is 21 knots, to be maintained on trial for twenty-four hours. Armoured cruiser Bayan.

Of the protected cruisers launched in 1900, the Aurora, Askold and Novik have been fully described in the *Naval Annual*. The following particulars have been given by the *Kronstadtski Vestnik* of the Bogatyr, which was launched at the Vulkan Shipbuilding Works, Stettin, on January 31. Her extreme length, 440 ft. 2 in.; beam, 54 ft. 6 in.; depth of hold, 34 ft. 1½ in.; with all her armament and 720 tons of coal, her displacement is 6750 tons, and her draught 20 ft. 10 in.; her engines are triple expansion, with four cylinders, and of 20,000 I.H.P., and are to give her a speed of 23 knots; steam is generated by sixteen Normand water-tube boilers; her bunker capacity is 1100 tons. Below the water-line she is divided into watertight compartments, and amidships, under her boilers, machinery, and ammunition room, she has a double bottom extending up her sides to the armour deck, which is 1·3 in. thick where horizontal, 2·7 in. approaching the vertical, and 2·12 in. towards the ends. The cruiser will carry twelve 6-in., twelve 3-in., six 1·8-in. (Hotchkiss), one 2·56 (Baranovsky), and two 1·45-in. (Hotchkiss) guns, the last three guns for landing purposes. She will also carry six torpedo tubes, one each forward and aft above water, and two above water and two submerged on the broadside. Six dynamos, four large and two small, will work the ventilators and ammunition hoists, and supply the electric lighting and six searchlights. Protected cruisers launched: Aurora, Askold, Novik, Bogatyr.

Boyarin. The Boyarin, which has been launched at Messrs. Burmeister & Wain's, Copenhagen, is a cruiser of about 3000 tons, of the Novik class.

Trials—Varyag. The official trials of the protected cruiser Varyag (6500 tons), built by Messrs. Cramp, at Philadelphia, took place off the New England coast at the end of July, 1900. Although an accident interfered with the proposed continuous twelve hours' run, the speed developed during seven hours and a half was so far in excess of the contract requirement that the Russian Board unanimously agreed that the essential elements of the trial had been complied with. During the run from Boston the speed trial began off Nantucket Shoals. A continuous speed of 23·6 to 23·7 knots was developed for seven and a half hours. At that point an accident occurred to one of the high-pressure cylinders, which compelled the shutting off of the engine affected. The remaining part of the contemplated trial was, therefore, abandoned. The Russian Board, however, took not only into consideration the speed developed in the first seven and a half hours, but also the speed which the vessel displayed previously on the run off Boone Island, when she made 24·6 knots in a spurt, and decided that there could be no reasonable doubt of the ability of the vessel to maintain a speed considerably in excess of the contract requirement of 23 knots an hour. She proceeded from Philadelphia to Cronstadt.

Trials—Nicolai I. The *Kronstadtski Viestnik* stated that at the machinery trials of the reconstructed battleship Nicolai I., on October 30, 1900, the engines developed only 5000 I.H.P., instead of the 8000 I.H.P. contracted for. This was attributed to the fact that the heating surface of the sixteen new Belleville boilers was too limited. The Admiral Nahimoff has been reconstructed at Cronstadt, and her new engines and Belleville boilers (9000 I.H.P.) are expected to give a speed of 18 knots. The whole of the artillery will be quick-firing.

Sevastopol The battleship Sevastopol was under trial in August. The fore turret jammed and the base was damaged, and other damage was done. It was also found that the ship had touched a sunken rock, but without great injury.

Torpedo craft. The destroyer Forel, built by M. Normand, at Havre, was launched on December 8, 1900, and the Ossetr, built at the Forges et Chantiers, Graville, near Havre, on January 23, 1901. They are sister boats, displacing 300 tons, having two torpedo tubes, and armed with one 12-pounder and five 3-pounders, and are intended to steam at 27 knots. The destroyer Som, built by Messrs. Laird, at Birkenhead, attained a speed of nearly 28 knots as the mean of six runs, thus exceeding the contract by almost a knot. It is said

that four destroyers will be built at Nikolaieff, and that five sea-going torpedo-boats are to be built at the Nevsky Works, in addition to five others ordered at Messrs. Creighton's yard at Abo.

ITALY.

Owing to financial exigencies and Ministerial instability the Italian shipbuilding programme has been retarded and modified. Lack of means has caused Italy to fall behind other nations in the matter of naval expansion, and she no longer holds the same relative position that she did. In naval circles it has therefore been felt that a programme was needed which would be accepted by the Parliament, and would remove the difficulties that arise from changes in the Cabinet and the naval administration. **Financial difficulties.**

A programme of Naval Construction, extending from 1901 to 1912, which has been under discussion, but has not been definitely adopted, is divided into three periods as follows: (1) 1901–1904, 203 million lire for work in hand and five ironclads of about 10,000 tons —24 millions each—sixteen destroyers, two auxiliary vessels, and reconstruction of the Italia and Lepanto. (2) 1905–1909, 139 millions for five more 10,000-ton armour-clads, two auxiliary ships, and eleven torpedo-boats, to replace obsolete ones. (3) 1910–1912, 77 millions to replace obsolete vessels. **The programme.**

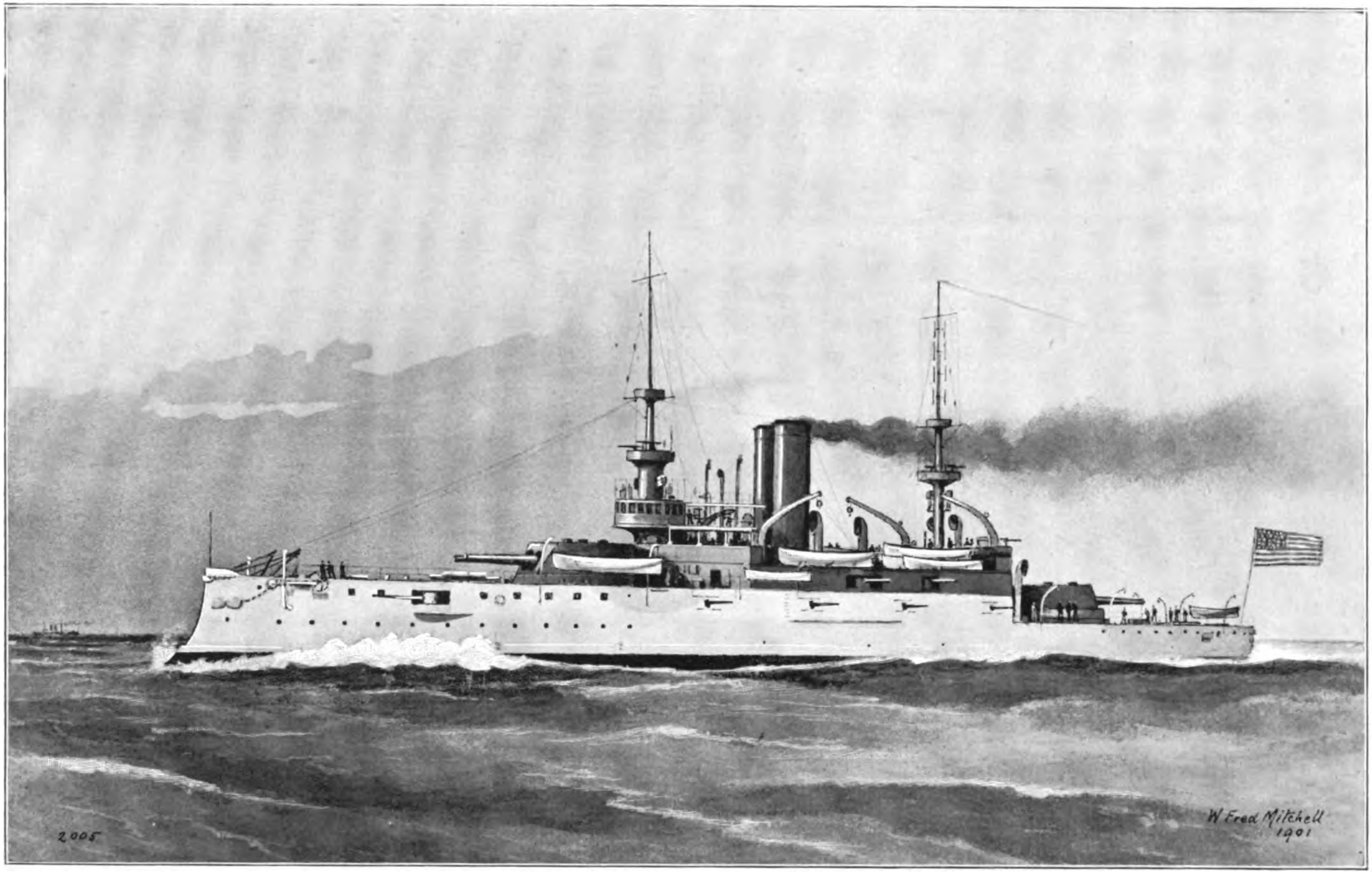
The class of small battleships or armoured cruisers of 8,000 tons, described in the *Naval Annual* last year, of which four—the Amalfi, Genova, Pisa, and Venezia—were to be built, has been abandoned, and instead two battleships of a new type, the Regina Elena and Vittorio Emanuele III., are to be built respectively at Spezia and Castellamare, and a third ship of the same class, the Roma, is contemplated. Probably only one will be laid down in 1901. These vessels will be of 12,624 tons, and will be well protected, heavily armed, and have a speed of 22 knots. There will be two 12-in. guns mounted singly in axial turrets, and twelve 8-in. guns coupled in six turrets, three on each side, the turrets amidships being at the level of the forward 12-in. gun. The distinguishing feature is the abandonment of the 6-in. Q.F., and the type is novel, presenting analogies both to the battleship and the armoured cruiser. The armour will be of Harveyised steel, and be produced at the Terni works; the other data of the ships will be found in the Tables. By the time this volume appears the battleship Regina Margherita, of 13,427 tons, should have been launched at Spezia. The class has already been described in the *Naval Annual*. The ship has a very powerful armament, consisting **The abandoned type.** **New battleships—Regina Elena, Vittorio Emanuele III., Roma.** **Regina Margherita.**

Benedetto Brin. of four 12-in., four 8-in., twelve 6-in. Q.F., eighteen 3-in. Q.F. and eight smaller guns. It is expected that the Benedetto Brin will be launched in September, being a sister of the Regina Margherita.

Trials, Varese. The trials of the armoured cruiser Varese took place in October and November, 1900. In the six hours' trial, with natural draught and 98 revolutions, the force developed being 9,479 I.H.P., the mean speed was 18·36 knots. In the forced draught trial in November, with a pressure of 201 lbs. per square inch, and 105 revolutions, the force being 13,885 I.H.P., the mean speed was 20·02. It has been stated by Signor Giuseppe Orlando that the Belleville boilers, as well as the engines, gave perfect satisfaction. They were in the hands of inexperienced stokers, were severely tried, and enabled the contract forced draught power to be exceeded and the engines to be stopped and suddenly started without injury. The ship has been built by Messrs. Orlando at Leghorn. The armoured cruiser Garibaldi. Giuseppe Garibaldi has also been under trial, her Niclausse boilers giving satisfaction. With natural draught the engines worked up to 10,000 I.H.P., being 1,000 more than the contract, and in the full speed trials the engines worked at 14,713 I.H.P., the contract speed of 20 knots was successfully attained. The cruiser has been built by Puglia. Messrs. Ansaldo at Sestri-Ponente. The third-class cruiser Puglia has also been under trial. The natural draught speed was 17·6 knots as the mean of a six hours' run, the maximum I.H.P. being 5,250, and the mean of the trials 4,900 I.H.P., with 125 revolutions. In the forced draught trial, lasting an hour and a half, the speed was 19·5 knots, with 7,500 I.H.P. The cruiser has been built by Messrs. Orlando at Leghorn.

Torpedo craft. The destroyer Ostro was launched by Herr Schichau at Elbing on February 9th, 1901. She is a sister of the Lampo, Freccia, Dardo, Strale and Euro, which are all in the water, and displace 320 tons, with a speed of 30 knots. The Nembo, Turbine, Aquilone, Borea, Meteoro and Tuono are in hand at Messrs. Pattison's yard, Naples, and are somewhat larger boats, displacing 330 tons.

Ships removed from the list. The *Italia Militare e Marina* states that the following ships are struck off the list:—Folgore, torpedo despatch vessel; Maria Adelaide and Vittoria Emanuele, training ships; Palestro and Conte di Cavour, harbour vessels. Notwithstanding this, the total value of the ships composing the Italian Navy, calculated at about £20,000,000 in the Navy Budget of 1900–1901, still shows an increase upon that of the previous year. This sum does not include the auxiliary vessels Ciclope and Velino, which the Minister of Marine expects to be added to the Navy during 1901.



"ALABAMA,"

UNITED STATES FIRST-CLASS BATTLESHIP.

THE UNITED STATES.

In the *Naval Annual* last year particulars were given of the builder's trial of the battleship Alabama, in which she attained a speed of 17·2 knots over a distance of 11½ miles. Her official trials took place on August 28 over the measured course between Cape Anne and Cape Porpoise, when, during a run of four hours, she made a mean speed of 17 knots, being one knot in excess of the contract. It is stated that the boilers maintained a steam pressure of 180 lb. and that an approximate horse power of 11,500 was developed. The number of revolutions averaged 114·6 over the whole course. No mishap occurred of any kind; the machinery ran with great smoothness, and the Cramp Company received the congratulations of the Navy Department. The final trials took from March 11th to 13th, 1901, with satisfaction. On a two hours' natural draught trial with 7,506 I.H.P. the speed was 15·2 knots. **Trials of the Alabama.**

The trials of the Kearsarge took place on April 3, 1900, and some reference to them was made in the *Annual* last year. The following are the details:—During the two-hour full-power speed trial with natural draft, all fires being lighted and the coal used being Pocahontas of fair quality, containing a large proportion of slack, the speed attained was 14·99 knots per hour. The machinery, both main and auxiliary, worked very satisfactorily, with the exception of a heavy steam leak in the high-pressure starboard piston rod stuffing-box. The boilers steamed freely. The following are the data: Average revolutions, starboard, 98·7; port, 96·9. Vacuum, starboard, 26 in.; port, 25·5 in. Average steam pressure, 154 lb. Coal per hour, 18,480 lb. I.H.P., 8,483·35. Main and auxiliary engines, pounds of coal per horse power 2·18. Speed by patent log 1 to 2 p.m., 14·18 knots. Speed by patent log to 3 p.m. 15·80 knots. Average speed, 14·99 knots, as given above. The turret guns were then tested, the four in each turret being fired simultaneously. During this test, the blast from the 8-in. guns in the super-posed turrets did not inconvenience the people in the 13-in. turrets below. Observation in the forward turret showed a slight deflection of the upper portion of the turret support, due to the firing. When all four guns were fired together, the socket of the turret securing-bolt slightly fouled the inner face of the barbette, but the turret support regained completely and immediately its normal form and the damage was small.* **Kearsarge.**

The preliminary trials of the battleship Wisconsin took place in **Wisconsin.**

* For Captain Folger's remarks on the ordnance trials, *cf. Naval Annual*, 1900, p. 45.

the Santa Barbara Channel, on October 11, when the mean speed was 17·158 knots in two runs over a measured course of 32 nautical miles. When corrected for tide and current the average became 17·174 knots. The mean draught at the trial was 23 ft. 6 in., according to the contract. The ship was under steam for four consecutive hours, and was found to be remarkably free from vibration, but her nautical qualities were not tried, the sea being quite calm at the time. The steering gear at all speeds answered very satisfactorily, including the hydraulic machinery, and the Board appointed to be present reported very favourably. They said that she answered remarkably well to her helm, turning in a noticeably short space, and holding a straight course with a minimum of attention to the helm. When she returned from Santa Barbara she steamed at 16 knots against wind and sea, and was pronounced to be a thoroughly efficient battleship.

Vessels launched: Wyoming, Arkansas, Nevada.

Three of the single-turret monitors were launched during the year: the Wyoming at the Union Iron Works, San Francisco, on September 8, the Arkansas at Newport News on November 10, and the Nevada (lately known as No. 8) at the Bath Ironworks on November 24. The following are the particulars of these vessels, which were designed by Rear-Admiral Hichborn, late Chief Naval Constructor. They have a single balanced turret on the keel line forward, containing two 12-in. guns, recently designed and to be used with smokeless powder, four 4-in. Q.F., three 6-pounder Q.F., and four 1-pounder machine guns. The monitors are of steel, not sheathed, with double bottoms and watertight subdivisions. The protection of the hull against injury to the water-line region is afforded by means of a side armour belt, the maximum thickness being 11 in., tapering to 5 in. at the armour shelf, the depth being 5 ft. The maximum thickness is abreast the engine and boiler spaces; frcm thence forward and aft it is reduced by steps to a minimum thickness of 5 in. at the bow and stern. The barbettes for the 12-in. guns have armour about 10 in. thick.

Torpedo craft.

The following destroyers have been launched: the Dale on July 24, the Decatur on September 26, the Lawrence on November 7, the Macdonough on December 24, and the Preble on March 2, 1901. The Perry has also taken the water during the year. All these are of the same type, though varying somewhat in dimensions, and the details will be found in the torpedo tables. All are fitted with twin-screw vertical inverted triple-expansion engines and Thornycroft boilers, estimated to give a speed of 30 knots with 8,400 I.H.P. in the case of the Macdonough and Lawrence, the others, with less power, being 29-knot boats. The torpedo equipment consists of two long 18-in. Whitehead tubes, one aft of the after conning tower

and one amidships. The complement consists of four officers and sixty-nine men, the ward-room officers and petty officers being located forward, and the crew aft.

During the year a number of first-class torpedo boats have also been launched, including the Bagley, Barney, Blakely, Cushing, De Long, O'Brien, and Thornton.

The torpedo boat Stringham has been under trial. The Bailey attained a speed of 30·06 knots as a mean of three runs. The Stockton steamed at various speeds up to 26 knots, with 360 revolutions and 300 I.H.P., but there was some damage to the machinery, and the boat went to her constructor to be repaired.

Very great attention has been directed to the question of submarine boats, and in the last Report of the Bureau of Construction it was stated that the past year had brought to fruition experimental work covering a considerable period, and had demonstrated the practicability of such boats. The Holland had shown herself capable of such perfect control in the vertical plane, that she could be kept within a few inches of any desired depth while moving, or be brought to the surface, and taken under water again in a very short time. Her direction and control in the horizontal plane on the surface were effected with the same facility as any other craft, and submerged were limited only by the difficulties of vision. The crew were provided for with reasonable comfort and perfect safety, working upon the surface or submerged, and the Bureau attributed to the submarine great offensive power. As regards the interior, Lieutenant Caldwell thus describes his experiences: "I did nothing at all except sit quietly on a stool and watch the manipulation of the boat. You can see it all. It is all open. You can see what every man is doing except the engineer, who is a little hidden from this big room. It is all in one room. Each man has his station, sitting on a stool. I took a position where I could watch the pressure gauge and watch the immersion. I could not have told sometimes if we were on the water or below if I had not watched that gauge. I watched the man steering. He had nothing to do but work the little wheel which regulates the immersion, and you saw how well it was done from the gauge. The captain stood on the steps under the tower with his head in the tower, and steered the boat and gave orders about going ahead, when to dive, and when to come up, and about filling the tanks and generally about running the boat." Submarine boats.

Admiral Hichborn, recently Chief of the Bureau of Construction, has great confidence in these boats. Giving evidence before a Committee of the House of Representatives, he insisted upon the view of Admiral Dewey, that the attack upon Manila would have been

impossible if submarine boats had been in the harbour. The nervous strain thrown upon officers and men would have been too great. It deserves to be noted, however, that Admiral Dewey has since explained that he had no small boats capable of dealing with such craft. Admiral Hichborn also said that such boats "would be a help to nervous people" at home, and he reminded the Committee, that, during the war with Spain, old monitors, condemned more than thirty years ago, had been sent down the New England coast to pacify the people. Admirals Dewey and Hichborn were supported by Admiral Farquhar, Captain Folger, Commanders Mason and Wainwright, Lieut. Caldwell, and others. Admiral O'Neil strongly opposed the submarine boat, on the ground that it was still experimental, and he insisted upon the dependence of such boats upon their base or upon convoy, their insufficient speed, and the difficulty of keeping them in order. "The only use of the Holland is to discharge torpedoes, and no weapon is more erratic and uncertain in its flight. It must be adjusted and launched with the greatest accuracy to have even a possibility of hitting its mark, and when discharged from a boat, as erratic in its movements as the Holland, the possibility is reduced to a minimum." Admiral Melville also argued against the boats. He said they would soon get out of order, and would be of little value in any case, and Admiral Bradford adopted the same line of argument.

In addition to the Holland and the Plunger there are already in hand, or provided for, six boats, of which the Adder, Moccasin, Porpoise, and Shark are in the yard of Lewis Nixon, at Elizabethport, New Jersey, and the Grampus and Pike at the Union Ironworks, San Francisco. The boats will be 63 ft. 4 in. long and 11 ft. 9 in. in diameter, and will displace 120 tons. Each will be driven by a single-screw 4-cylinder Otto gasolene engine of 160 I.H.P., giving a speed of 8 knots on the surface, while the main motor will be of the "electric water-proof" type, developing 70 horse power and giving a speed of 7 knots a-wash or submerged. The tank capacity for gasolene will be 850 gallons. Each of the boats will have a conning tower 21 in. in diameter, protected by 4-in. armour, and will carry five 18-in. Whitehead torpedoes. The price of each boat is 170,000 dols., and according to contract all should be completed before July 25, 1901.

The new battle-ships.

Congress authorised, on March 3, 1899, the construction of three battleships of about 13,500 tons, but, owing to difficulties in regard to armour, many months elapsed before contracts were invited. Two other battleships were authorised on June 7, 1900, and designs for the whole five have been prepared. A compromise was effected in regard to the types, it being decided that three of the ships should be provided with superposed turrets, as in the Kearsarge and Kentucky,

and two with the 8-in. guns mounted in independent turrets. In February, 1901, however, an augmented board on naval construction presented a report, from which only two of its members dissented, in favour of the superposed turret plan for all five ships, and the Secretary of the Navy has approved the recommendation. The report was signed by Rear-Admirals O'Neil, Bradford, and Melville, and Captains Sigsbee, Evans, A. Walker, Chadwick, Converse, C. E. Clark, and Taylor. Three of the ships were intended to be sheathed and coppered, while the others were to be unsheathed, but it has recently (March, 1901) been decided that all shall be unsheathed, as also the new cruisers, with the exception of those of the Denver class.* It may, in this place, be enough to say that the trial displacement of the battleships will probably be about 15,000 tons. The other particulars will be found in the tables. Propulsion will be by a pair of vertical, twin-screw, 4-cylinder triple-expansion engines of 19,000 I.H.P., running at about 120 revolutions per minute, and steam at 250 lb. per square inch will be generated by twenty-four straight water-tube boilers placed in six water-tight compartments. In the *Naval Annual* last year many particulars were given of the armament of the new ships, but some changes have now been introduced and the following particulars will be interesting. It may be useful to compare the armament proposed with that in the Duncan class, with the remark that the latter has no answer to the 8-in. guns, and has six fewer 3-pounders:—

New American Type.	Duncan Class.
Four 12-in.	Four 12-in.
Eight 8-in.	——
Twelve 6-in.	Twelve 6-in.
Twelve 14-pounders.	Twelve 12-pounders.
Twelve 3-pounders.	Six 3-pounders.

The 12-inch guns, which are to be of 40 calibres length, will be in pairs in balanced turrets, training on an arc of 270 deg. Four of the 8-in. guns will be coupled in the superposed turrets, while the other four will be in pairs in turrets, one on each beam, these having a training arc of 145 deg. The 6-in. guns will be on the main-deck in the armoured citadel, and will have an arc of fire of 110 deg., while the other guns are to be in advantageous positions, and there will be four machine guns mounted, two in each of the lower tops, and four single-shot 1-pounders, two in each of the upper tops. The whole of the turrets will be controlled and operated electrically. The particulars given last year of the armour were accurate, but the fact

* The battleships Georgia, Virginia, and Nebraska will be built respectively by the Bath Ironworks, the Newport News Company, and the Moran Company, of Seattle, Washington, and the New Jersey and Rhode Island by the Fore River Engine Company.

that a citadel for the 6-in. guns will be formed by 6-in. transverse bulkheads deserves to be noted. The magazines will contain 60 rounds for each 12-in. gun, 125 for each 8-in., 200 for each 6-in., 250 for each 14-pounder, and 500 for each 3-pounder, besides a large supply of small ammunition.

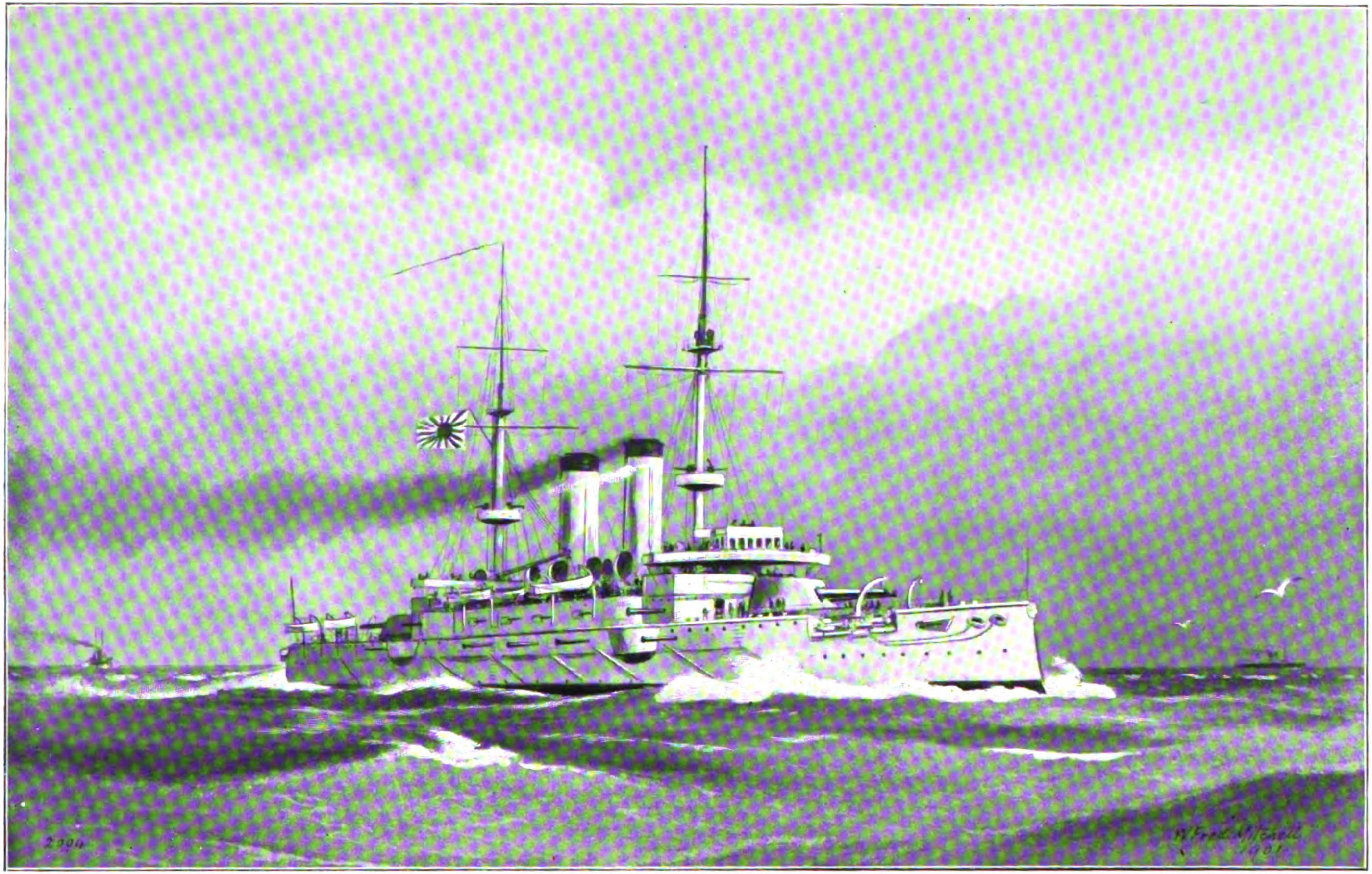
Armoured cruisers.

Three armoured cruisers were authorised in March, 1899, and three in June, 1900—the California, Pennsylvania, West Virginia, Maryland, Colorado, and South Dakota. The type was generally described in the *Annual* last year in regard to protection and armament. These cruisers are to be propelled by twin-screw four-cylinder triple-expansion engines of 23,000 I.H.P., the steam to be generated by water-tube boilers in eight water-tight compartments, and the speed to be not less than 22 knots. Three other armoured cruisers, described in America as "protected," were provided for in June, 1900—the Charleston, Milwaukee, and St. Louis. The particulars given in the tables are according to specification. The proposed armament of fourteen 6-in. quick-firers is intended to be distributed thus: six on pedestal mounts with shields on the main deck, and four in sponsons at the corners of the super-structure, the other eight being on the gun-deck, mounted four on each broadside in a central casemate. Here also will be twelve 14-pounder guns, while six more will be on the super-structure, as well as twelve 3-pounders, and there will be four 1-pounder and machine guns in the tops, and four 1-pounder quick-firers forward and aft on the gun deck. Arrangements are to be made whereby all the guns which do not train fore and aft, or nearly so, can be quickly and conveniently dismounted, housed, and secured, so as to leave the ship's side practically clear. Protection will be provided by central water-line armour 4 in. thick, above which will be another range of plating of the same thickness, connected forward and aft by transverse bulkheads 3 in. thick. The ships will also be protected with steel of 4 in. thickness above the lower casemate, and there will be protection for the guns at the angles of the super-structure as well as an armoured deck.

Programme of 1901.

In the Naval Appropriation Bill, as presented by the Naval Committee of the House of Representatives on January 19, 1901, the following occurs:—

The Committee recommends building by contract two unsheathed sea-going battleships, carrying the heaviest armour and the most powerful ordnance for vessels of their class, upon a trial displacement of about 14,000 tons each, to have the highest practicable speed and great radius of action, and to cost, exclusive of armour and armament, not exceeding $3,850,000 each, and two unsheathed armoured cruisers, carrying the heaviest armour and most powerful ordnance for vessels of their class, upon a trial displacement of about 14,000 tons each, and to have the highest practicable speed and great radius of action, and to cost, exclusive of armour and armament, not exceeding $4,000,000 each. Maximum cost of the vessels herein authorised, exclusive of armour and armament, will be $15,700,000.



"MIKASA,"

JAPANESE FIRST-CLASS BATTLESHIP.

As finally passed, the Naval Appropriation Bill sanctioned this programme, but only in general terms, the Senate Amendment for the building of three additional submarine boats being rejected, and the Secretary of the Navy was directed to prepare plans and descriptions to be presented to the new Congress in December, 1901. By directing this delay, Congress failed to make provision for any additions to the Navy in the new Bill.

JAPAN.

Battle-ships. Mikasa launch.

The Mikasa, the last of the battleships of the present programme building in England, was launched at Messrs. Vickers's, Barrow-in-Furness, on November 8th, 1900. She is a sister of the Asahi and Hatsuse, which she closely resembles in the matter of displacement, dimensions and armament, though there are important differences in regard to protection. The following account of her characteristics is from the *Times*:—

Length between perpendiculars, 400 feet; over all, 432 feet; beam, 76 feet; and at a draught of 27 feet 2 inches the displacement is about 15,150 tons. The engines will develop 15,000 horse-power, calculated to give a speed of 18 knots. Her normal coal supply will be 700 tons, with capacity for 1,400 tons, which will allow of her travelling about 9,000 miles at a speed of ten knots. The engines will be of the triple expansion type with three cylinders, and there will be 25 Belleville boilers, with economisers. She is protected by a complete armour belt consisting of Harveyed nickel steel of Vickers's manufacture, of 9-inch thickness over a space of 156 feet amidships, covering the vital portions of the vessel; this is continued forward and aft by armour tapering from 7 inches to 4 inches, terminated at the after end by a 6-inch bulkhead, thus forming a complete protection over the entire water-line of the ship. The belt extends from 5 feet 3 inches below the water-line to 2 feet 6 inches above, and is there met by the 6-inch citadel armour, which continues the protection from the top of the belt to the upper deck. The citadel comprises the chief departure from ordinary practice in the design, as, besides protecting the space between the belt and the main deck battery, it takes the place of the ordinary arrangement of casemates usually found in British and foreign battleships, and entirely protects the 6-in. guns on the fighting deck. By this arrangement throughout the whole of the centre portion of the ship the crew are protected from injury when working the guns, while the gun positions themselves are equally protected in front as in the casemate arrangement, and are infinitely less vulnerable from behind, which is protected now by the 6-inch armour on the opposite side of the ship, as well as by the thick steel bulkheads which divide the gun positions one from another. The conning tower is protected by 14 inches and the observer tower aft by 3 inches of armour. In addition to the above protection there is a protective deck below the main deck, which extends throughout the whole length of the ship, and consists of 2 inches of armour on the flats and 3 inches on the slopes. The heavy armament is four 12-in. breech-loading guns, mounted in pairs forward and aft. These are placed in armoured barbettes 14 inches thick above the upper deck, and 10 inches thick below, where they are covered by the screen bulkhead. The heavy quick-firing armament is composed of fourteen 6-in. guns, ten of them mounted in the armoured citadel above described, and four of them mounted on the upper deck in casemates. In addition to these there are twenty 12-prs., eight 3-prs., and four 2½-prs., all quick-firing guns; and the torpedo equipment consists of four submerged tubes, two forward and two aft. The weight of metal discharged by this armament in one minute is 11½ tons, representing a striking energy of 1,337,130 foot tons, while the weight of metal discharged from the guns available on one broadside in a minute is 7¼ tons, giving a striking energy of just under 1,000,000 foot tons. The ship is divided thoroughly by watertight compartments.

Asahi trials.

The trials of the Asahi, built and engined by Messrs. John Brown & Co., Ltd., of Clydebank, took place in March, 1900, on the

measured mile in Stokes Bay and in the Channel. In Stokes Bay the following were the results:—613 I.H.P., 6·69 knots; 1,610 I.H.P., 9·28 knots, and 4,355 I.H.P., 13·06 knots. The high-speed consumption trial showed that with 12,947 I.H.P., the consumption was only 1·59 lb. per horse-power per hour. There was a high wind and a heavy sea, but the records taken gave an approximate speed of 17·5 knots. The ship then made her full-power trial between Start Point and Berry Head, a distance of 12·26 nautical miles. Four runs were made, the first and third being in the teeth of a north-easterly gale; but with this disadvantage the mean speed was 18·3 knots. The speeds on the four runs were:—First run, 17·92 knots; second run, 18·08 knots; third run, 18·65 knots; fourth run, 18·3 knots. The mean I.H.P. for the entire series of runs was slightly over 16,000. After the full-speed trial circles were made to port and starboard with each steam-steering engine, the vessel being still at full speed, and at a speed of 15 knots the hand-steering gear was successfully tried. On the return to Spithead, at 17 knots, the stopping, starting, and reversing trials were carried out. After the trials, through misadventure, the ship was carried by the current upon the beach at Southsea, and, when she was placed in dry dock at Portsmouth, it was found that the plates under the fore barbette had buckled in for about 40 ft. on the starboard side and 20 ft. on the port side, some of the frames being broken. The damage done has since been made good. The sister ship Hatsuse, built at Elswick, which represented Japan at Queen Victoria's funeral, has also been successful at her trials.

Cruisers launched. Iwate. Chihaya.

The armoured cruiser Iwate was launched at Elswick, in April, 1900, and has steamed at 21·8 knots. She is a sister of the Idzumo, which was fully described in the *Annual* last year. At Yokosuka the torpedo-gunboat Chihaya has been launched. Information from Japan shows her to have a displacement of 857 tons, but she has been described as a cruiser of 1,230 tons. She has engines of 5,500 horse-power, steam being developed by Normand boilers, and is to steam at 21 knots.

Torpedo craft.

Messrs. Thornycroft have received an order from the Japanese Government to build two 31-knot destroyers, similar to the six which the same firm has built, and a similar order has been received by Messrs. Yarrow. It is stated that at Kure six 120-ton torpedo-boats will be built, and will receive the names of Awataka, Hato, Hibari, Kari, Kiji, and Tsubamo.

MINOR NAVIES.

Austria-Hungary.

The coast-defence battleship Habsburg, built from the designs of Herr Popper, who made the plans for the Monarch, was launched at Trieste in October, 1900. She displaces 8,340 tons, and her other data will be found in the tables. She represents a stronger type than the Monarch, and has larger coal capacity, giving her greater range of action. The hull is built of Martin steel, and the double bottom extends for 63 per cent. of the ship's length, with watertight compartments to the number of 174, and extensive pumping apparatus. The maximum thickness of the armour plating, which is of special steel, is 8¾ in., and, like the double bottom, it extends for 63 per cent. of the length, with a breadth of nearly 8 ft. Transverse bulkheads unite the side armour at the ends, and above is the steel deck. In this way a citadel is formed, and there is deck protection forward and aft. Above the main belt thinner plating covers the sides up to the main deck. The three 9·4-in. guns are placed two in the forward barbette, and one in the after barbette. There are also twelve 5·9-in. Skoda quick-firers, placed in casemates, which are superposed in pairs, three on a side, the guns thus being on two stages. It seems likely that in bad weather the lower casemates might be out of action. Sixteen Belleville boilers are in two watertight compartments, and there are four stoke-holds. The two principal engines are of the triple-expansion four-cylinder type. The ship is provided with bilge keels. She was eighteen months on the stocks from the date of laying down, and was to be completed within three years from the same date. **Ships launched. Monarch.**

The torpedo-cruiser Szigètvár, which is a sister of the Aspern, was launched at Pola on October 29th; she has Yarrow boilers and engines, of 7,800 tons, and is to have a speed of 14 knots. **Szigètvár.**

The trials of the Kaiser Karl VI. were successfully completed in September, 1900. The engines worked up to 12,900 horse-power instead of 12,800 horse-power as required, and the speed attained was 20¾ knots per hour, or three-quarters of a knot per hour in excess of the rate provided for. **Trials.**

The following statement indicates the work now in hand and contemplated for the Austrian Navy—(1) A protected cruiser "E," of 7,400 tons, to supersede the frigate Radetzky. (2) The torpedo-gunboat Szigètvár. (3 and 4) Two battleships of 8,300 tons, with engines of 11,000 horse-power and a speed of 18 knots, building at the Stabilimento Tecnico Triestino. The armour-belt and the pro-

tection of the turrets will be 7·8, 8·2, and 8·6 in. thick, and the armour deck 2·6 in. thick, all of nickel steel. Each ship will carry three 9·4-in. Krupp and twelve 5·9-in. Skoda Q.F., and twenty-four smaller guns, including machine guns, and several torpedo-tubes. Both ships will probably be launched this autumn. (5) A third battleship of the same type as the two preceding, proposed to be laid down this year, to replace the obsolete Erzherzog Albrecht. (6) A fourth battleship, of 10,000 tons, proposed for 1901, which is to take the place of the Laudon. The Laudon (frigate), the Hun (gunboat) and the paddle-steamer Andreas Hofer are to be struck off the list, though the Laudon will still be used as a training-ship. The increase in the *personnel* of the navy will amount altogether to 2,500 men.

China.

The most important event in the history of the Chinese Navy since the *Annual* last appeared was the capture by the Allies at Taku of the four destroyers built at Elbing in 1898 and 1899, which have now been added to the navies of Great Britain, France, Russia, and Germany, each boat bearing the name of Taku.

Denmark.

A torpedo transport, to be known as the Beskytteren, is in hand. The following are the particulars:—Displacement, 389 tons; length, 142 ft. 5 in.; beam, 25 ft.; draught, 10 ft. 10 in. Steam will be developed by Babcock and Wilcox boilers, and the engines will develop 600 I.H.P., to give a speed of 12 knots. The armament will comprise three 1·8-in. Q.F.

Greece.

The armourclads Hydra and Spetsai of 4,885 tons, which, owing to the outbreak of war with Turkey could not receive in 1897 the changes introduced into the Psara, have been completed. Their armament now comprises three 10·6-in. Canet guns, five 5·9-in., one 3·9-in., eight 2·5-in., and sixteen smaller guns.

Liberia.

The two gunboats which composed the whole navy of the Republic, the Gorronomonah and Rocktown, have both perished. The first sank as she lay at anchor, while the other was wrecked in the St. Paul river.

Mexico.

The *Mittheilungen aus dem Gebiete des Seewesens* states that a naval programme has been adopted for which £200,000 has already been voted. It is to be carried out in the course of five years, eight gunboats of 1,000 tons' displacement and a speed of 18 knots being built; also two torpedo-boats. Four of the gunboats will be for the Pacific coast, and four for the Gulf of Mexico.

The Netherlands.

Ships building.

The Naval budget for 1901 amounts to £1,383,000, being about £25,000 more than in the previous year. The amount for ship-building alone is £350,000, and this will be sufficient to pay for the completion of the Koningin Regentes, 4,950 tons, and three torpedo-boats; the continuation of the two sister ships of the Koningin Regentes, the De Ruyter, and another vessel yet unnamed; and the commencement of a coast-defence ship. The Koningin Regentes, which has been launched, may be described as an improved Evertzen, but with many differences. Her general particulars will be found in the tables. She has a complete armour belt of Harveyized steel, with a maximum thickness of 6 in., and the turret protection is 10 in. thick, and are practically armoured towers containing all the hoisting, turning, and elevating gear, protected at their base by the side armour. She is the first ship of her size (5,000 tons) to be completely fitted with Yarrow boilers. The type is now adopted for the Dutch Navy, and has been fitted in the cruisers of the Gelderland class.

Torpedo-craft.

Messrs. Yarrow have in hand at Poplar three first-class torpedo-boats of 130 tons, 152 ft. 6 in. long, the Ophir, Pangrango, and Rindjani which, like all the other Poplar destroyers built for the Netherlands Government, have Yarrow water-tube boilers. The first-named was launched in March, 1901. The Hydra was under trial in May, 1900, when a mean speed of 24·37 knots was attained with a load of 17½ tons. The trials of the Scylla was equally satisfactory. Both vessels have been built for service in the Dutch East Indies.

A full account of the shipbuilding programme and of the new cruiser type was given in the *Annual* last year.

Norway.

Eidsvold.

The coast-defence armourclad Eidsvold was launched on June 14th, 1900, from the Elswick shipyard. The following are the particulars: 290 ft. long, 50 ft. 6 in. beam, 16 ft. 6 in. draft, and displacement 3,847 tons, with a guaranteed speed of 16½ knots.

The ship is to be armed with two 8·2-in. Q.F. guns, six 5·9-in., eight 12-pdrs., six 3-pdrs., and two torpedo-tubes (submerged). The vessel has an armour belt of Harveyized steel 6 in. in thickness. The casemates, four in number, are of nickel-steel armour, 5 in. thick. The barbettes are of nickel-steel, 6 in. thick. The machinery is of the twin-screw vertical triple expansion type, with Yarrow boilers to develop 4,500 I.H.P. A sister ship is in hand.

Portugal.

It is stated that the central battery ship Vasco da Gama, intended for the defence of the port of Lisbon, is to be modernised, and to receive water-tube boilers in two water-tight compartments protected by coal bunkers. The proposed armament is four 7·8-in. Q.F. guns, in barbette turrets, protected by $7\frac{3}{4}$ inches of steel, four 4·7-in. Q.F., eight semi-automatic 1·8-in. and two machine guns. The cruiser Rainha Amelia is being completed at Lisbon for her trials.

Spain.

The loss of the Spanish colonies, and therefore the new strategic condition that has arisen in regard to national defence, casts great doubt upon the future of the Spanish Navy. There is a strong movement on foot for the maintenance of the fleet upon its old level, and a Navy League, largely supported, has been founded to further the project; but on the other hand a considerable party desires to devote the means at the disposal of the government to other purposes.

Vessels launched. Cataluña.

Two cruisers have been launched during the year. The armoured cruiser Cataluña, which took the water at Cartagena on September 24th, is described as follows:—Length between perpendiculars, 348 ft.; beam, 61 ft.; depth of hold, 38 ft.; draught, $21\frac{1}{2}$ ft.; displacement, 7,000 tons; engines, vertical and triple expansion, 10,000 I.H.P. with natural draught, and 15,000 horse-power with forced draught, giving speeds of 18 and 20 knots. The coal capacity of the bunkers is 1,200 tons, giving her a range of action of 10,000 miles at 10 knots. The armour belt is 230 ft. 6 in. long, 5 ft. 6 in. wide, and from 10 in. to 12 in. thick, the protection of her turrets being about the same. The armour deck is from 2 in. to $2\frac{3}{4}$ in. thick. The machinery is also protected by a layer of coal above it and at the sides. She will carry two 11-in., ten 5·5-in., two 2·7-in., four 2·2-in., four 1·45-in., and four machine guns; also five torpedo-tubes submerged. Wood has been used as little as possible in her construction.

Estremadura.

A smaller cruiser, the Estremadura, built out of subscriptions collected by Spanish colonists in Mexico, was launched at Cadiz on April 29th, 1900. Her length is 290 ft.; beam, 36 ft.; draught, 14 ft.;

displacement, 2,030 tons. Her armour deck is composed of two layers of plates each an inch thick. She carries four Hontoria 5·9-in. Q.F. guns, four Krupp 4·2-in. Q.-F., four 2·2-in., two machine guns, but no torpedo-tubes. Her two engines are vertical and triple expansion, with eight Thornycroft boilers, developing 7,000 I.H.P., to give her a speed of 20 knots.

Removals from list. It is stated that a number of vessels are being struck off the effective strength of the navy, and the following names are given. In view of the uncertainty of the Government policy several of the vessels are, however, at present retained in the lists :—Alfonso XII. and Alfonso XIII., first-class cruisers ; Conde de Venadito, Isabel II., and Marques de la Enseñada, second-class cruisers ; Temerario, Martin Alonzo Pinzon, Vicente Yañez Pinzon, Marques de Molins, and General Valdes, torpedo-gunboats ; Eulalia, Pilar, Condor, Aguila, Seguira, Cuervo, and Tarifa, gunboats ; Retamosa, Rigel, Ejército, and Castor, torpedo-boats ; and five coast-defence ships. The armoured cruisers Numancia and Vitoria, and the unarmoured cruiser Infanta Isabel, will, it is said, be treated in the same manner as soon as their boilers require renewing or any other important repair is called for.

SWEDEN.

Provision is made in the budget for the completion of the three coast-defence vessels, A, B, and C, which were fully described in the *Annual* last year, and for the modifications which are in progress in the Svea, Göta and Thule, as well as in the monitors, Thordön and Tirfing. The Dristigheten has been launched at Gothenborg. She is a coast-defence turret ship of 3,500 tons, well protected and heavily armed, and like the other new Swedish ships, provided with Yarrow water-tube boilers, these being for 6,000 I.H.P., and to give a speed of 16·5 knots.

The torpedo-cruiser Psilander, built at the Bergsund Yard, Stockholm, has undergone satisfactory trials. With natural draught (2,946 I.H.P.) she steamed at 19 knots, and with forced draught (4,475 I.H.P.) at 20·5 knots.

With the development of the fleet, the naval yards on the islands of Skeppsholmen and Kastellholmen have become inadequate, and new establishments are to be founded nearer Stockholm.

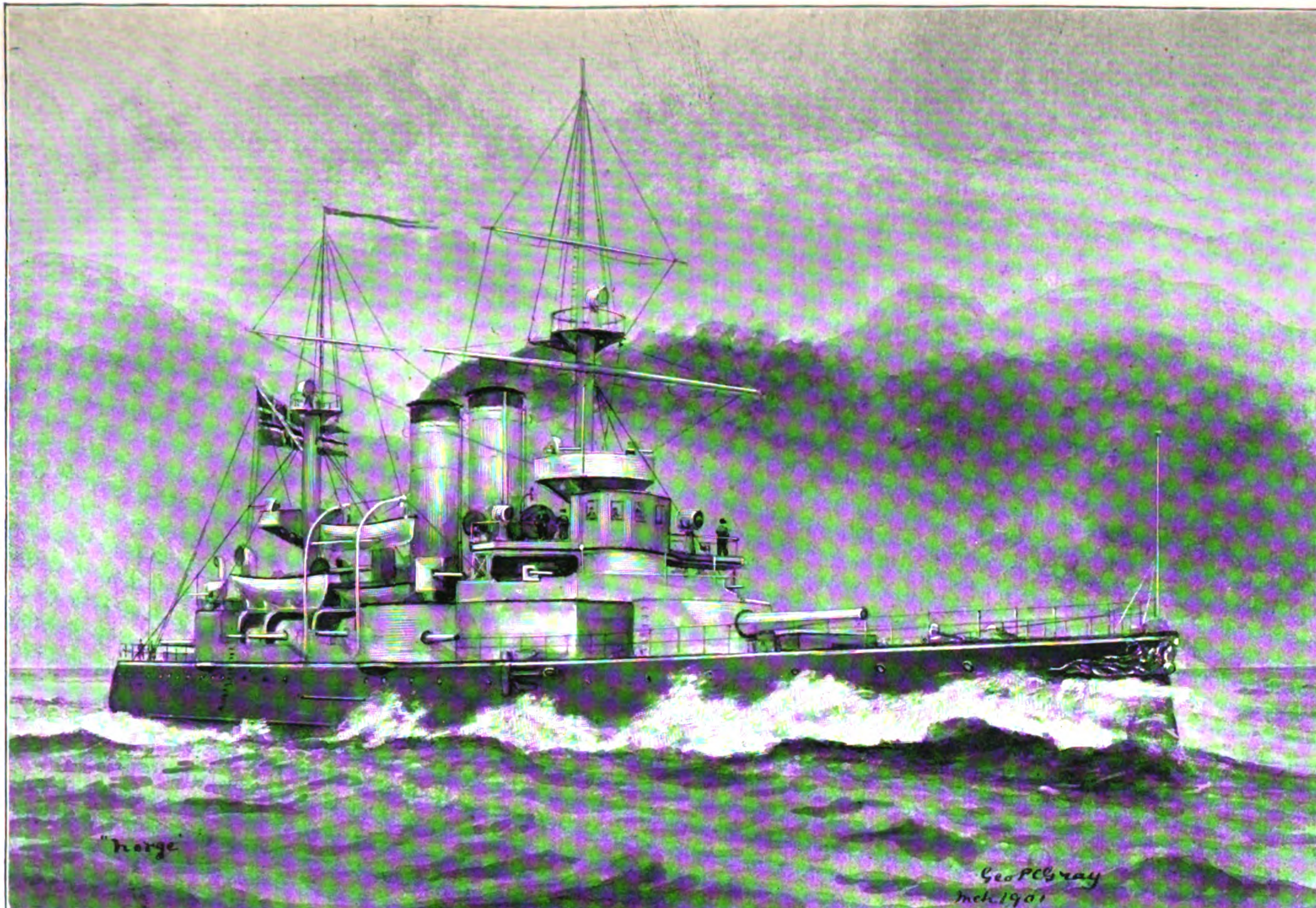
TURKEY.

Messrs. Ansaldo, of Sestri Ponente, are now well advanced with the re-construction of the old central battery ironclad Messoudieh, to which allusion was made last year. The hull has been partially

rebuilt for the emplacement of the new guns which have been supplied, two 9·2-in., twelve 6-in. Q.F., fourteen 3-in. Q.F., ten 6-pdrs. Q.F., and two 3-pdrs. Q.F. The engines have been built by the same firm, and are of 11,000 I.H.P., the force being supplied by water-tube boilers. Messrs. Ansaldo have launched, or will do so during the year, two small destroyers or large torpedo-boats for the Ottoman Navy. They displaced 145 tons and are 156 ft. long, with 18 ft. 6 in. beam, and 4 ft. draught. The engines are of 2,400 I.H.P. and are to give a speed of 26 knots. There are two torpedo-tubes, and the guns are two 1-pdrs.

As an indication of the intention of the Ottoman Government to re-constitute the navy if possible, it may be interesting to note that a contract has been signed with Messrs. Krupp for the supply or 208 quickfiring guns, including four 8·2-in., fifty-two 5·9-in., fifty six 2·9-in., eighty 2·2-in., and sixteen 1·8-in.

JOHN LEYLAND.



"NORGE,"

NORWEGIAN COAST-DEFENCE SHIP.

CHAPTER IV.

Comparative Strength.

Ships in Commission—Mediterranean and Channel.

According to the custom of the *Naval Annual*, the first place in this chapter is devoted to the distribution of naval force, concerning which the accompanying tables are almost sufficiently explanatory. The Channel Squadron remains unchanged in its composition, but the Niobe, which was detached to South Africa at the outbreak of the war, has returned. In the Mediterranean, eight destroyers and four first-class torpedo boats have reinforced the squadron, and the Hood has replaced the Ocean, which was sent to China. The increase of torpedo craft is timely, but it is certainly not too considerable, in view of the large additions now being made to the French flotillas in those waters, and of the new importance which is being given to the stations of the mobile defence, not only in France, but also in Corsica, Algeria and Tunis. In both the Channel and Mediterranean the number of cruisers attached to the squadrons still leaves very much to be desired.

British Reserve Squadron.

A notable step has been taken in reorganizing the Reserve Squadron, composed of the coastguard and portguard ships, which, instead of having only part complements on board, are now kept fully manned, and are intended to assemble twice or three times in the course of the year for cruising and steam tactics. Its first cruise in the new conditions was in March, 1901. An additional coastguard ship, the Camperdown, has been established at Rathmullen. The Reserve Squadron is thus in a better posture to support the Channel Squadron, and when some of the old ships have been relieved by the comparatively modern vessels which will presently be available from the Mediterranean and other stations, it will become an effective fighting force.

The French Squadrons.

The French Northern or Channel Squadron remains unchanged, except that the Hoche, which has been undergoing considerable modifications, has replaced the Redoutable, despatched to China. The coast-defence squadron, consisting of the four ships of the Valmy class, which was last year in the Mediterranean, has returned to the Channel. Through this change the Reserve Division in the Mediterranean has for the present ceased to be an effective force. There, however, the squadron has been strengthened by the addition of the St. Louis, and has now seven modern battleships, forming a force which may be regarded as practically homogeneous. In both

	GREAT BRITAIN.			FRANCE.			RUSSIA.
Class.	**Mediterranean Fleet.**	**Channel Fleet.**	**Reserve Squadron of Coast and Port Guard Ships.**	**Mediterranean Fleet.** Permanent Squadron.	**Mediterranean Fleet.** Reserve Ships.	**Northern Squadron.**	**Mediterranean.**
Battleships	Canopus Cæsar Empress of India Hood Illustrious Ramillies Renown Royal Oak Royal Sovereign Victorious Devastation (Gibraltar)	Hannibal Jupiter Majestic Magnificent Mars Prince George Repulse Resolution	Alexandra (C.G.) Benbow (C.G.) Camperdown (C.G.) Collingwood (C.G.) Colossus (C.G.) Howe (P.G.) Nile (P.G.) Rodney (C.G.) Sans Pareil (P.G.) Trafalgar (P.G.)	Gaulois Charlemagne Bouvet Brennus Charles Martel Jauréguiberry Saint Louis	Terrible * Magenta *	Carnot Masséna Amiral Baudin Courbet Formidable Hoche Iéna **	Alexander II.‖
Coast-Defence Ships	Rupert (Alexandria) Orion (Malta)	..	..	D'Entrecasteaux* Châteaurenault *	Tempête (Bizerta)	Amiral Tréhouart Bouvines Jemmapes Valmy Cocyte (Dunkirk)	Khrabry
Cruisers, 1st Class	Andromeda Theseus	Diadem Niobe	Australia Galatea	Chanzy, Latouche-Tréville Pothuau	..	Dupuy-de-Lôme Bruix Tage **	..
Cruisers, 2nd Class	Diana, Gladiator Vindictive	Arrogant Furious	Severn	Du Chayla Cassard	..	D'Assas	..
Smaller Cruisers and Gunboats	9	Pactolus Pelorus	Melampus	Galilée, Lavoisier Linois	..	Surcouf	1
Torpedo-Gunboats	Halcyon, Hussar, Dryad, Speedy Salamander Sandfly (reserve) *Torpedo Depôt Ship.* Vulcan	..	8	Condor (Crete) Dunois *Torpedo Depôt Ship.* Foudre	Lévrier (Corsica) Dague (Algeria) Flèche (Tunis) Casabianca (Tunis) Mouette, Vautour (Constantinople)	Cassini Durandal La Hire Ste. Barbe (Dunkirk)	Abrek
Destroyers	14	..	5	12†	..	5‡	2

* At Toulon; not attached to Mediterranean Squadron. † Hallebarde, Espingole and 10 sea-going boats, including 6 at Toulon and at Tunisian and Algerian ports. ‡ Fauconneau and 4 sea-going boats. ‖ To be reconstructed at La Seyne. ** At Brest; not attached to squadron.

the Mediterranean and Channel the cruisers have been organized as light divisions under rear-admirals.

The Italian Squadron at present in commission in the Mediterranean, under command of the Duke of Savoy, consists of the battleships Lepanto, Sardegna, Sicilia, Dandolo, Doria and Morosini, the torpedo gunboats or destroyers Urania, Partenope, Lampa and Rapido, and the torpedo-boats included within the inspectorate at Genoa, Spezia, Gaeta, Taranto, Civita Vecchia and Venice. Italy.

The Boxer rising in China, and the difficulties with the Chinese Government which ensued, leading to hostile operations in the Peiho, and an advance of the forces of the Allies to Peking brought about a considerable accession to the naval strength of the Powers in the Far East. Never before have such fleets been assembled in Chinese waters, and it may be taken for granted that the additions to the squadrons represent a considerable permanent augmentation of maritime force which will throw new burdens upon the countries concerned. The large increase now being made in the Russian Pacific Squadron is, no doubt, the determining factor, and it is worthy of note, since many of the new Russian ships have been, and are being, built for service in those waters, that the Boxer trouble merely accelerated a development which would sooner or later have become inevitable on other grounds. Naval strength in the Far East.

The British Squadron on the China station has been augmented by the arrival of two new battleships, the Ocean and Glory, making five in all. The Blenheim has been added to the first-class cruisers and the Argonaut has relieved the Undaunted. The Dido, Isis, and Astræa have joined the flag from the Mediterranean, and the first two named will remain in China. The Arethusa came from the Pacific, and the Wallaroo, Mohawk, and Lizard were detached from Australia; but the Mohawk returns home, while the Marathon was for some months in Chinese waters, but has returned to her station in the East Indies. Two destroyers, the Otter and Janus, have been added to the squadron, and the river-gunboat Robin has been commissioned for service in the West River, while the steamer Pioneer has been purchased as a gunboat for the Yang-tse, where she has done good work. Vice-Admiral Sir Cyprian A. G. Bridge succeeds Sir Edward Seymour in command. Great Britain.

Notwithstanding these considerable additions to British strength, there was a tendency in some quarters to censure the Admiralty for not having done more. In effect the German Government turned the balance of force on the China station by despatching thither the major part of the effective fleet, and assembled at Kiao-Chau and off the Chinese ports a very imposing naval force. It may be Germany.

remarked, however, that, inasmuch as the Powers were allied in their efforts to obtain reparation from China, there was no necessity for a competition of strength in their naval forces, and if the contrary should be held, it is reasonable to point out that the Germans, by making a demonstration which was perhaps exaggerated in China, seriously weakened the available forces in home waters. It may be surmised, however, that the despatch of the second division of the battle squadron, comprising the Kurfürst Friedrich Wilhelm, Brandenburg, Weissenburg and Wörth, with the third-class cruiser Hela, was intended to impress upon the legislature the necessity of building those cruisers for foreign service, which were originally included in the Navy Bill, but were withdrawn, under parliamentary pressure, from the Government proposals. In addition to the second division of the battle squadron and the ships of the cruising squadron in Chinese waters, four third-class cruisers and a gunboat were detached from the American, Australian and East African stations. It has been stated that the four battleships, and possibly some other vessels named in the table, would return to Germany about May, 1901, but this is improbable, for officers and men to relieve those on the station have recently left Germany. All the ships are temporarily under the Admiral commanding the cruising squadron.

Russia. The Russian battleships in the Far East at the beginning of the Boxer trouble were the Petropavlovsk, Navarin, and Sissoi Veliky, and the Poltava and Sevastopol, leaving European waters in December 1900, have since joined them. To the five first-class cruisers on the station the Gromoboi was added shortly afterwards, as well as the destroyers Kassatka, Skat, Kit, Delphin and Som. The Moskva of the Volunteer Fleet has also been commissioned to serve as a cruiser in Chinese waters. It is understood that the squadrons are to be still further strengthened by the despatch of several ships which are now under trial or approaching completion. The *Marine Rundschau* reports that during the year 1901 the Peresviet and Retvisan will join the force, making in all seven battleships with an aggregate displacement of about 76,700 tons, and complements numbering 4,470, as well as the armoured cruiser Bayan, making seven vessels of the class, aggregating 63,500 tons, with complements of 4,586. According to the same authority, the new protected cruisers Varyag, Bogatyr, Askold and Novik are also to be despatched, making five vessels of the class, of 30,000 tons, with 2,550 officers and men. To these ships must be added two armoured gunboats, seven small cruisers and gunboats, three torpedo-gunboats, twenty torpedo-boats, seven harbour torpedo-boats, and three mining vessels, giving a total of sixty-one vessels, and about 14,000 officers and men.

SHIPS IN COMMISSION.

EASTERN ASIA.

CLASS.	BRITISH.	FRENCH.	RUSSIAN.	GERMAN.	UNITED STATES.
BATTLESHIPS	Glory Ocean Goliath Centurion Barfleur	Redoutable	Petropavlovsk Poltava Sevastopol Navarin Sissoi Veliky	K. Friedrich Wilhelm Brandenburg Weissenburg Wörth	Oregon Kentucky
1st-Cl. CRUISERS	Blenheim Orlando Argonaut Aurora Endymion Terrible	Vauban Amiral Charner Guichen	Rossia Rurik Gromoboi Ad. Nahimoff Dmitri Donskoi Vladimir Monomach Moskva (as cruiser)	Kaiserin Augusta Fürst Bismarck	Brooklyn
2nd-Cl. CRUISERS	Arethusa Bonaventure Hermione Pique Astræa Dido Isis	Descartes Pascal Bugeaud Chasseloup-Laubat Friant	Ad. Korniloff	Hertha Hansa Irene Gefion	Albany Newark New Orleans
3rd-Cl. CRUISERS	Alacrity Brisk Wallaroo	..	Zabiaka Razboynik	Hela Seeadler Geier Schwalbe Bussard	..
SLOOPS, etc.	18*	7 8 (Cochin-China and Tonquin)	6	4	16†
TORPEDO-GUNBOATS	..	..	3	..	..
DESTROYERS	6	1	6	1‡	..
ARMOURED GUNBOATS	..	Achéron Styx	Gremiastchy Otvajny	..	..
MONITORS					Monadnock Monterey

* Including 5 river gunboats.

† This includes the Isla de Cuba, Isla de Luzon and Don Juan de Austria, captured from the Spaniards at Manila. The United States have besides several auxiliary cruisers and other vessels in commission in the Philippines, as well as about 20 gunboats bought and captured from Spain, and a small "mosquito squadron" has recently been despatched.

‡ And 3 torpedo-boats.

SHIPS IN COMMISSION.

EAST INDIES.

CLASS.	BRITISH.	FRENCH.
2nd-Cl. CRUISER . . .	Highflyer	Catinat
3rd-Cl. CRUISERS . . .	Marathon Cossack Pomone Racoon*	Infernet Nielly
SLOOPS and GUNBOATS . .	2	[illegible]
TORPEDO-GUNBOATS . .	1 *in reserve*	
COAST-DEFENCE SHIPS . .	Magdala Abyssinia (*In reserve*)	

* To be relieved by Perseus.

ATLANTIC.

CLASS.	BRITISH.		FRENCH.	UNITED STATES.
	CAPE.	AMERICA.		
BATTLESHIPS . .	Monarch (*In reserve, Capetown*)			Massachusetts Kearsargo Alabama
COAST-DEFENCE SHIPS	..	Hotspur (*In reserve, Bermuda*)		
1st-Cl. CRUISERS .	..	Crescent		
2nd-Cl. CRUISERS .	Gibraltar Forte Thetis* Sappho* Terpsichore	Indefatigable Flora† Tribune Charybdis	Cécille Suchet Isly	Chicago
3rd-Cl. CRUISERS .	Magicienne Philomel Barracouta Barrosa Tartar	Pallas Proserpine Psyche		Atalanta
SLOOPS and 1st-Cl. GUNBOATS . .	6	4	2	3
DESTROYER . . .		2		

* Temporarily detached from the Channel and South-East Coast of American stations.
† To be relieved by Cambrian.

The Russian Naval Commander-in-Chief is Vice-Admiral Alexieff, who is also Military Governor, while Vice-Admiral Shrydloff is in command of the Pacific forces.

France. Italy. Austria.

The French squadron was strengthened by the addition of the reconstructed battleship Redoutable, the armoured cruisers Amiral Charner and Vauban, and the protected cruiser Guichen, while the number of second-class cruisers was brought up to six. The D'Entrecasteaux, which had been flagship of Rear-Admiral Courrejolles, has, however, returned to Toulon to undergo some modifications. The Italians have also maintained a considerable force in Chinese waters, being the Ocean Division, with the exception of the Dogali, comprising the armoured cruiser Vettor Pisani (flagship of Rear-Admiral Candiani), and the Fieramosca, Stromboli, Vesuvio, Elba, and Calabria. Austria has likewise been well represented.

Cape of Good Hope.

The decreased tension of affairs in South Africa has enabled several cruisers detached from other stations to return. The Gibraltar relieves the Doris as flagship of Rear-Admiral A. W. Moore, who succeeds Sir Robert Harris in the command of the station.

The following table of ships in commission in the Pacific calls for no comment :—

SHIPS IN COMMISSION.

PACIFIC.

Class.	British.		United States.
	Australian Station.	Pacific Station.	
Battleship	..	..	Iowa
1st-Cl. Cruisers	Royal Arthur	Warspite	..
2nd-Cl. Cruisers	..	Arethusa Leander Phaeton	Philadelphia
3rd-Cl. Cruisers	Katoomba (Sydney reserves). Mildura Ringarooma Tauranga Wallaroo Mohawk Porpoise Pylades	..	Marblehead
Sloops and Gunboats	3	2	2
Torpedo-Gunboats	1	..	..
Destroyer	..	1	..

The French have the second-class cruiser Protet and 2 sloops, and the Germans two small cruisers, in commission in the Pacific.

Comparative strength.

In regard to the important question of comparative strength, the present writer has not introduced many modifications into the tables which follow. Certain vessels which last year appeared as third-class battleships have been deemed unworthy to retain their place in that comparatively unimportant list, and are included among coast-defence ships, and it is evident that other ships in the same category must soon receive the same treatment. A number of old and useless vessels have been eliminated from the coast-defence list, and it has been thought unnecessary to retain the distinction between coastguard and harbour-defence ships. In the lists of new vessels, both battleships and cruisers, the new ships have been included, and the fact that many of them are still unfinished is indicated by the names being printed in italics. It is believed that no ship has been included in these lists that has not been laid down, or that is not actually provided for, to be at once put in hand, and the programme ships are indicated in footnotes.

First-class battleships. Great Britain, France, Russia.

From the list of first-class battleships given on p. 80, it will be seen that our situation is generally satisfactory in regard to numbers. It includes, in effect, thirty-eight vessels, while three more are in the programme of 1901–2, as compared with thirteen ships for France and fourteen for Russia, making twenty-seven in all. It will be observed that not less than fourteen out of our thirty-eight ships are still uncompleted, though some should soon be ready for the pennant, in comparison with eleven uncompleted ships in the case of the Powers of the Dual Alliance. The question of retarded construction is fully dealt with in another chapter in this volume. It may also be pointed out that France and Russia have lost their lead as the great foreign ship-building Powers, and that Germany and the United States are taking their place. Most friendly relations happily exist between Great Britain and these two Powers, but it should not, nevertheless, be lost sight of that, contrasted with their combined strength, our situation does not appear in a light so decidedly favourable, while the vigorous shipbuilding policy adopted by these Powers promises most rapid expansion. As an indication of this promise and of the recent character of the development, it will be instructive to note that while of battleships actually on the stocks or just about to be commenced, we have four, Germany and the United States have six and eight respectively.

Germany. United States.

Second-class battleships.

It is not enough, however, to consider first-class battleships only; the list of second-class ships is instructive. It includes eleven British ships and twenty French and Russian, while, of the ten French vessels, nine have recently been or are now being reconstructed, receiving new armament and new machinery, and the tenth is a new

ship just on the point of completion. Moreover, three of the Russian ships are quite modern; only two of the British ships can be so described.

Turning now to the cruiser list, we find that we have forty-three of the first-class built and building, as compared with thirty-two in the case of France and Russia. This would seem encouraging, but many of our vessels have been delayed; and, looking to the whole cruiser class and realizing the great demand for such vessels in time of war, it cannot be said that the position is yet satisfactory. Indeed during the last ten years, the Powers of the Dual Alliance have begun almost as many cruisers as ourselves. In reckoning cruiser needs we have, however, to consider rather the vast demands of the fleet than the lists of other Powers. **Cruisers.**

There is a difficulty in estimating the comparative naval strength at the close of the present year, but the following statement is probably accurate in regard to completed battleships:— **Estimated strength.**

Battleships.	England.	France.	Russia.	France and Russia.
First-class	26	10	8	18
Second-class	11	10	10	20
Third-class	10	11	1	12
Total . . .	47	31	19	50

It may therefore be concluded that we shall have a distinct superiority in completed first-class battleships over the Dual Alliance, but that, in view of the modernizing of the second-class battleships of France, the practical equality of numbers in the first two classes possessed by England on the one hand and France and Russia on the other, is not reassuring, and that the need is urgent for pushing forward the ships in course of construction.

JOHN LEYLAND.

Comparative Tables of British, French, Russian, Italian, German, United States, and Japanese Ships.

TABLE I.—FIRST-CLASS BATTLESHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
1891	Empress of India	
1891	Hood	
1892	Ramillies	
1892	Repulse	14,150
1892	Resolution ...	
1892	Revenge	
1892	Royal Oak ...	
1891	Royal Sovereign	
1895	Renown	12,350
1894	Magnificent ...	
1895	Majestic	
1895	Prince George ...	
1895	Victorious ...	
1896	Cæsar	14,900
1896	Hannibal	
1896	Illustrious ...	
1895	Jupiter	
1896	Mars	
1897	Canopus	
1899	Glory	
1898	*Albion*	
1898	Goliath	12,950
1898	Ocean	
1899	*Vengeance* ...	
1898	Formidable ...	
1898	*Irresistible* ...	
1899	Implacable ...	15,000
1899	*London*	
1899	*Venerable* ...	
1899	*Bulwark*	
	Cornwallis ...	
1901	*Duncan*	
	Exmouth	
1901	*Russell*	14,000
1901	*Albemarle* ...	
1901	*Montagu*	
	Queen	15,000
	Prince of Wales	
	38 ships.*	

FRANCE.

Launched.	Name.	Displacement.
		tons.
1891	Br.nnus	11,395
1894	Carnot	12,008
1893	Charles Martel	11,880
1893	Jauréguiberry...	11,824
1895	Masséna	11,924
1896	Bouvet	12,200
1895	Charlemagne ...	
1896	Gaulois	11,275
1896	St. Louis	
1898	Iéna	12,052
1899	*Suffren*	12,728
	2 A 8, A 10 ...	14,865
	13 ships.	

RUSSIA.

Launched.	Name.	Displacement.
		tons.
1892	Tri Sviatitelia...	
1900	*Kniaz Potemkine Tavritchesky*	12,480
1894	Petropavlovsk...	
1894	Poltava	10,960
1895	Sevastopol ...	
1898	Peresviet	
1898	Oslabya	12,674
1900	*Pobieda*	
1900	*Retvisan*	12,700
1901	*Cesarevitch* ...	13,110
	Borodino	
	Alexander III...	13,600
	Orel	
	Kniaz Souvaroff	
	14 ships.	

ITALY.

Launched.	Name.	Displacement.
		tons.
1888	Re Umberto ...	13,825
1890	Sardegna	13 860
1891	Sicilia	13,375
1897	*E. Filiberto* ...	9,800
1897	*San Bon*	
	Rª Margherita	12,427
	Eenedetto Brin	
	Rª Elena... ...	12,624
	Emanuele III. .	
	9 ships.‡	

GERMANY.

Launched.	Name.	Displacement.
		tons.
1891	Brandenburg ...	
1891	Kurfürst Friedrich Wilhelm	10,100
1891	Weissenburg ...	
1892	Wörth	
1896	Kaiser Friedrich III.	
1897	Kaiser Wilhelm II.	
1899	Kaiser Wilhelm der Grosse ...	11,000
1900	*Kaiser Barbarossa*	
1899	*Kaiser Karl der Grosse*	
1900	*Wittelsbach* ...	
	D	
	E	
	F	11,800
	G	
	H	
	J	
	16 ships.	

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
1893	Indiana	
1893	Massachusetts...	10,288
1893	Oregon	
1896	Iowa	11,340
1898	Kearsarge... ...	11,565
1898	Kentucky... ...	
1898	Alabama	
1898	Illinois	11,525
1898	Wisconsin ...	
	Maine	
	Missouri	12,400
	Ohio	
	New Jersey ...	
	Georgia	
	Virginia	14,948
	Nebraska... ...	
	Rhode Island . .	
	17 ships.‖	

JAPAN.

Launched.	Name.	Displacement.
		tons.
1896	Fuji	12,320
1896	Yashima	
1899	Asahi	15,000
1899	Hatsuse	
1898	Shikishima ...	14,850
1900	*Mikasa*	15,200
	6 ships.	

* 3 projected. ‡ 1 projected. ‖ 2 projected.

TABLE II.—SECOND-CLASS BATTLESHIPS.

GREAT BRITAIN.			FRANCE.			RUSSIA.			ITALY.			GERMANY.			UNITED STATES.			JAPAN.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.									
1888	Nile	11,940	1883	Baudin	11,911	1892	Georgi Pobiedonosetz	10,280	1880	Italia...	14,387									
1887	Trafalgar		1879	Duperré	11,200	1891	Navarin	10,206	1883	Lepanto	14,400									
1886	Anson	10,600	1881	Courbet	10,808	1886	Catherine II. ...		1885	Andrea Doria ...										
1885	Benbow	10,600	1879	Dévastation ...	10,704	1887	Sinope	10,181	1884	Lauria	11,000									
1885	Camperdown ...	10,600	1885	Formidable ..	12,165	1886	Tchesmé		1885	Morosini										
1882	Collingwood ...	9,500	1886	Hoche	10,997	1894	Sissoi Veliky ...	8,880												
1885	Howe	10,300	1890	Magenta	10,851	1896	Rostislav													
1884	Rodney	10,300	1887	Marceau	10,850	1889	Nicolai I.	9,672												
1887	Sans Pareil ...	10,470	1887	Neptune	10,983	1887	Alexander II. ...	9,927												
1893	Barfleur	10,500	1899	*Henri IV.*	8,948	1890	Dvenadzat Apostoloff ...	8,076												
1892	Centurion... ...																			
	11 ships.			10 ships.			10 ships.			5 ships.										

Table III.—Third-Class Battleships.

Great Britain.			France.			Russia.			Italy.			Germany.			United States.			Japan.		
Launched.	Name.	Displacement. tons.	Launched.	Name.	Displacement. tons.	Launched.	Name.	Displacement. tons.	Launched.	Name.	Displacement. tons.	Launched.	Name.	Displacement. tons.	Launched.	Name.	Displacement. tons.	Launched.	Name.	Displacement. tons.
1875	Alexandra ...	9,490	1873	Friedland... ...	8,994	1872	Peter Veliky ...	9,891	1878	Dandolo	11,202	1880	Baden	7,441	1892	Texas	6,315	1882	Chin Yen ...	7,400
1882	Colossus	9,420	1876	Redoutable ...	9,437				1876	Duilio	10,138	1878	Bayern							
1882	Edinburgh ...		1885	Caiman	7,239							1877	Sachsen							
1871	Devastation ...	9,330	1883	Indomptable ...	7,234							1878	Württemburg...							
1872	Thunderer ...		1885	Requin	7,822							1874	Deutschland ...	7,319						
1875	Dreadnought ...	10,820	1881	Terrible	7,575							1874	Kaiser	7,531						
1876	Inflexible... ...	11,880	1879	Vauban	6,208							1884	Oldenburg ...	5,200						
1870	Sultan	9,290	1892	Bouvines	6,610															
1875	Superb	9,170	1893	Tréhouart... ...	6,629															
1876	Temeraire ...	8,540	1892	Jemmapes ...	6,592															
			1892	Valmy																
10 ships.			11 ships.			1 ship.			2 ships.			7 ships.			1 ship.			1 ship.		

TABLE IV.—FIRST-CLASS CRUISERS.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
16	Impérieuse	8,400
16	Warspite	
21½	Blake	9,000
21½	Blenheim	
19¾	Crescent	7,700
20	Edgar	7,350
20	Endymion ...	7,350
19¾	Gibraltar	7,700
20	Grafton	7,350
20	Hawke	7,350
19¾	Royal Arthur ...	7,700
19¾	St. George ...	7,700
20	Theseus	7,350
22	Powerful	14,200
22	Terrible	
20½	Andromeda ...	11,000
20½	Diadem	
20½	Europa	
20½	Niobe	
20¾	Amphitrite ...	11,000
20¾	Argonaut	
20¾	Ariadne	
20¾	*Spartiate*	
21	Aboukir	12,000
21	Cressy	
21	*Hogue*	
21	Sutlej	
21	*Euryalus*	
21	*Bacchante* ...	
23	*Drake*	14,100
23	*Good Hope* ...	
23	*King Alfred* ...	
23	*Leviathan* ..	
23	*Monmouth* ...	9,800
23	*Kent*	
23	*Bedford*	
23	*Essex*	
23	*Berwick*	
23	*Cornwall*	
23	*Cumberland* ...	
23	*Donegal*	
23	*Lancaster* ...	
23	*Suffolk*	
	43 ships.*	

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
20	Dupuy de Lôme	6,406
19	D'Entrecasteaux	8,114
23	Guichen	8,277
23	Jeanne d'Arc ...	11,329
23	Châteaurenault	8,018
21	*Dupetit Thouars*	9,517
21	*Gueydon*	
21	*Montcalm*... ...	
21	*Condé*...	10,000
21	*Sully*	
21	*Gloire*	
21	*Desaix*	7,700
21	*Dupleix*	
21	*Kléber*	
21	*Marseillaise* ...	10,014
21	*Amiral Aube* ...	
21	*Léon Gambetta*	12,416
21	*Jules Ferry* ...	
21	*Victor Hugo* ...	
	19 ships.†	

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
16½	Admiral Nahimoff	8,524
18	Pamyat Azova	6,675
18	Rurik	10,933
20	Rossia	12,130
20	*Aurora*	6,630
20	*Diana*	
20	*Pallada*	
20	Gromoboi	12,236
21	*Bayan*	7,800
23	*Askold*	6,500
23	*Bogatyr*	
23	Varyag	
23	*Unnamed*... ...	6,375
	13 ships.‡	

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
20	Carlo Alberto...	6,396
20	Vettor Pisani ...	
20	Giuseppe Garibaldi	7,282
20	Varese	
20	*F. Ferruccio* ...	
	5 ships.‖	

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
21	Kaiserin Augusta	6,231
19	Fürst Bismarck	10,650
20½	*Prinz Heinrich*	8,868
20½	*B*	
20½	*K. Wilhelm Ersatz (C)* ...	
	5 ships.	

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
21·9	Brooklyn	9,215
21	New York ...	8,200
22·8	Columbia	7,375
23	Minneapolis ...	
22	*West Virginia*	13,680
22	*California* ...	
22	*Pennsylvania*	
22	*Colorado*	
22	*Maryland* ...	
22	*South Dakota*...	
22	*St. Louis*	9,700
22	*Charleston* .	
22	*Milwaukee* ...	
	13 ships.§	

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
21½	Asama	9,750
21½	Tokiwa	
21	Azuma	9,436
20	Yakumo	9,850
21	Idzumo	9,750
21	Iwate	
	6 ships.	

* 6 projected. † 4 projected. ‡ 3 projected. ‖ 1 projected. § 2 projected.

Table V.—Second-Class Cruisers.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
16	Aurora	
16	Australia... ...	
16	Galatea	
16	Immortalité ...	5,600
16	Narcissus... ...	
16	Orlando	
16	Undaunted ...	
17	Amphion... ...	
17	Arethusa... ...	
17	Leander	4,300
17	Phaeton	
17	Forth	
17	Mersey	
17	Severn	4,050
17	Thames	
19	Astræa	
19½	Bonaventure ...	
19½	Cambrian... ...	
19½	Charybdis ...	
19½	Flora...	4,360
19½	Forte...	
19½	Fox	
19½	Hermione... ...	
19¾	Æolus	3,600
20	Andromache ...	3,400
20	Apollo	3,400
19¾	Brilliant	3,600
19¾	Indefatigable ...	3,600

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
18	Bruix	4,754
18	Chanzy	4,933
18	Charner	4,792
18	Latouche Tréville	4,756
19	Pothuau	5,360
19	Cécille	5,933
19	Tage...	7,589
19½	Alger	4,332
19	Isly	4,477
19	Jean Bart... ...	4,109
19½	Bugeaud	3,740
19½	Chasseloup-Laubat... ...	3,758
19½	Friant	3,739
19½	Pascal	4,015
19	Descartes... ...	3,990
17	Sfax	4,728
20	Suchet	3,440
19	Cassard	3,952
19	D'Assas	4,000
19	Duchayla... ...	3,952
19	Catinat	4,065
19	Protet	4,055
23	*Jurien de la Gravière* ...	5,605

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
16	Dimitri Donskoi	5,882
15	Vladimir Monomach	6,061
14	Minin	6,136
15	Gerzog Edinburgski	5,050
14	General Admiral ...	4,722
17½	Admiral Korniloff ...	5,817
20	Svietlana	3,828

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
19	Marco Polo ...	4,527
20	Vesuvio	3,373
18	Etna	3,474
17½	Fieramosca ...	3,542
19	Stromboli... ...	3,420

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
20	Gefion	4,207
20	Irene...	4,400
19	Prinzess Wilhelm ...	
21	Freya	
21	Hansa	
21	Hertha	5,650
21	Victoria Luise	
21	Vineta	

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
20	Albany	3,600
20	Baltimore... ...	4,413
18	Chicago	4,500
19	Newark	4,098
20	New Orleans ...	3,600
21½	Olympia	5,800
19½	Philadelphia ...	4,324
19	Cincinnati ...	3,213
19	Raleigh	
19½	San Francisco...	4,098
16½	*Denver*	
16½	*Des Moines* ...	
16½	*Chattanooga* ...	3,400
16½	*Galveston* ...	
16½	*Tacoma*	
16½	*Cleveland*... ...	

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
17	Hashidate ...	
17	Itsukushima ...	4,277
17	Matsushima ...	
18½	Naniwa	3,700
18½	Takachiho ...	
22	Chitose	
22	Kasagi	4,760
23	Takasago... ...	4,160
23	Yoshino	4,180
23	*Unnamed*... ...	4,160

19⅝	Intrepid	3,600						
19⅝	Iphigenia	3,600						
20	Latona	3,400						
20	Melampus ...	3,400						
20	Naiad	3,400						
19⅝	Pique	3,600						
19⅝	Rainbow	3,600						
19⅝	Retribution ...	3,600						
20	Sappho	3,400						
20	Scylla	3,400						
19⅝	Sirius	3,600						
19⅝	Spartan	3,600						
20	Sybille	3,400						
20	Terpsichore ...	3,400						
20	Thetis	3,400						
20	Tribune	3,400						
19¼	Diana	5,600						
19¼	Dido							
19¼	Doris							
19¼	Eclipse							
19¼	Isis							
19¼	Juno							
19¼	Minerva							
19¼	Talbot							
19¼	Venus							
19	Arrogant							
19	Furious	5,750						
19	Gladiator							
19	Vindictive ...							
20	Hermes	5,600						
20	Highflyer							
20	Hyacinth							
21	*Challenger* ...							
21	*Encounter* ...							
	62 ships.		23 ships.	7 ships.	5 ships.	8 ships.	16 ships.	10 ships.

Table VI.—Third-Class Cruisers.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
18	Iris	3,730
18	Mercury	
16¾	Fearless	1,580
16¾	Scout...	
16½	Archer	
16½	Brisk...	
16½	Cossack	
16½	Mohawk	1,770
16½	Porpoise	
16½	Racoon	
16½	Tartar	
17	Alacrity	1,700
17	Surprise	
17½	Barham	1,830
17½	Bellona	
16½	Barracouta ...	
16½	Barrosa	1,580
16½	Blanche	
16½	Blonde	
19	Magicienne ...	
19	Marathon ...	2,950
19	Melpomene ...	
19	Medea	2,800
19	Medusa	
19	Pallas	
19	Pearl	
19	Philomel	
19	Phœbe	
19	Katoomba ...	2,575
19	Mildura	
19	Ringarooma ...	
19	Tauranga... ...	
19	Wallaroo	
20¼	Pelorus	
20	Proserpine ...	
20	Pactolus	
20	Pegasus	
20	Perseus	2,135
20	Pomone	
20	Prometheus ...	
20	Psyche	
20	Pyramus	
20	Pandora	2,200
20	Pioneer	
	44 ships.*	

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
18	Milan	1,733
19¼	Coëtlogon	1,932
20¼	Cosmao	1,954
20¼	Forbin	1,820
20¼	Lalande	1,926
20¼	Surcouf	2,014
20¼	Troude	2,026
20	Davout	2,291
20	Linois	2,345
20	Galilée	2,317
20	Lavoisier	
20¼	D'Estrees	2,452
20¼	Infernet	
	13 ships.	

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
15	Rynda	3,508
15¼	Pamyat Merkuria ...	3,000
25	*Novik*	3,000
26	*Boyarin*	3,000
25	*Unnamed* † ...	3,000
	5 ships.	

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
21	Piemonte	2,500
19	Calabria	3,508
19½	Dogali	2,055
18	Elba	2,690
17½	Giovanni Bausan	2,922
19	Etruria	
21	Lombardia ...	2,245
18	Liguria	
18	Umbria	
20	Puglia	2,550
16	C. Colombo ...	2,675
	11 ships.	

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
16	Blitz	1,380
16	Pfeil	
16½	Bussard	1,827
16	Condor	
16	Cormoran	1,614
16	Geier	
16	See-Adler ...	
15½	Falke	1,703
23	Greif...	1,971
23	Hela	
19	Gazelle	2,650
21½	Nymphe	
21½	Niobe	
20	*Ariadne*	2,600
20	*Medusa*	
20	*Thetis*	
20	*Amazone*	
	G	
	18 ships.	

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
15½	Atalanta	3,000
15½	Boston	
18½	Detroit	
18½	Marblehead ...	2,089
18½	Montgomery ...	
	5 ships.	

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
20	Akashi	2,700
19	Akitsushima ...	3,150
18	Idzumi	2,950
20	Yayeyama ...	1,600
20	*Miyako*	1,800
20	Suma	2,700
	6 ships.	

* 2 projected.

† Several others of this class are said to be included in the programme.

TABLE VII.—COASTGUARD AND HARBOUR DEFENCE SHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
1879	Agamemnon ...	8,660
1880	Ajax	
1865	Bellerophon ...	7,550
1868	Hercules	8,680
1868	Monarch	8,320
1870	Swiftsure	6,910
1881	Conqueror... ...	6,200
1885	Hero	
1872	Rupert	5,440
1870	Abyssinia ...	2,900
1879	Orion...	4,870
1870	Magdala	3,340
1871	Glatton	4,910
1871	Cyclops	
1871	Gorgon	3,560
1871	Hecate	
1870	Hotspur	4,010
	17 ships.	

FRANCE.

Launched.	Name.	Displacement.
		tons.
1877	Fulminant ...	5,965
1883	Furieux	5,019
1876	Tempête	4,869
1880	Tonnant	5,091
1875	Tonnerre	5,858
1878	Vengeur	4,709
1885	Achéron	1,721
1887	Cocyte	1,714
1892	Phlégéton ...	1,796
1892	Styx	1,796
1885	Flamme	1,128
1884	Fusée	1,142
1888	Grenade	1,089
1886	Mitraille	1,128
	14 ships.	

RUSSIA.

Launched.	Name.	Displacement.
		tons.
1894	Adm. Senjavin	4,126
1893	Adm. Oushakoff	
1896	Gen. Adm. Apraxine ...	4,200
	Adm. Boutakoff	5,985
1868	Adm. Chicagoff	3,505
1867	Adm. Greig ...	3,462
1868	Adm. Lazareff	3,462
1867	Adm. Spiridoff	3,500
1864	Charodeika ...	2,026
1875	Kniaz Pojarski	5,138
1873	Popoff	3,590
1892	Novgorod... ...	2,706
1890	Gremiastchy ...	1,500
1892	Grostjastchy ...	1,492
1895	Otvazny	1,500
1868	Khrabry	1,492
	16 ships.	

ITALY.

Launched.	Name.	Displacement.
		tons.
1865	Affondatore ...	4,062
1863	Maria Pia... ...	4,268
1863	San Martino ...	
	3 ships.	

GERMANY.

Launched.	Name.	Displacement.
		tons.
1890	Beowulf	
1891	Frithjof	
1893	Hagen	3,500
1892	Heimdall	
1892	Hildebrand ...	
1889	Siegfried	
1895	Aegir...	3,600
1894	Odin	
1878	Basilisk	
1876	Biene...	
1878	Camaleon ...	
1879	Crocodil	
1881	Hummel	
1887	Mucke	1,109
1880	Natter	
1880	Salamander ...	
1877	Skorpion	
1876	Viper...	
1876	Wespe	
	19 ships.	

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
1883	Amphitrite ...	
1876	Miantonomoh ...	3,990
1883	Monadnock ...	
1883	Terror	
1891	Monterey	4,084
1884	Puritan	6,060
1900	*Arkansas*... ...	
1900	*Nevada*	4,000
	Florida	
1900	*Wyoming*... ...	
	10 ships.	

JAPAN.

Launched.	Name.	Displacement.
		tons.
1890	Hei-Yen	2,000
	1 ship.	

TABLE VIII.—TORPEDO GUNBOATS.

GREAT BRITAIN.		
Speed.	Name.	Displacement.
kts.		tons.
19	Grasshopper ...	
19	Sandfly	525
19	Spider	
18¼	Rattlesnake ...	550
20	Assaye	
20	Boomerang ...	
20	Gleaner	
19	Gossamer	
20	Karrakatta ...	
20	Plassy	735
20	Salamander ...	
20	Seagull	
20	Sharpshooter ...	
20	Sheldrake ...	
20	Skipjack	
20	Spanker	
20	Speedwell... ...	
19	Alarm	
19	Antelope	
19	Circe	
19	Hebe	
19	Jaseur	
20	Jason...	810
19	Leda	
19	Niger	
19	Onyx	
19	Renard	
20¼	Speedy	
19	Dryad	
19	Halcyon	
19	Harrier	1070
19	Hazard	
19	Hussar	
18	Polyphemus ...	2640
	34 ships.	

FRANCE.		
Speed.	Name.	Displacement.
kts.		tons.
17¾	Condor	1243
17	Epervier	1288
17¼	Faucon	1239
18	Fleurus	1310
17¼	Vautour	1235
18¼	Wattignies ...	1292
18¼	Bombe	420
18	Couleuvrine ...	435
18	Dague	408
18	Dragonne... ...	410
18	Flèche	425
18	Lance	402
18	Sainte-Barbe ...	437
18	Salve...	413
18¾	Léger	517
18¼	Lévrier	505
21¼	Casablanca ...	960
21¼	Cassini	958
21¼	D'Iberville ...	967
23	Dunois	896
23	Lahire	
	21 ships.	

RUSSIA.		
Speed.	Name.	Displacement.
kts.		tons.
20	Captain Sacken	742
20	Lieutenant Ilyn	714
22	Gaidamak ...	
22	Vzadnik	400
22	Griden	
21	Kazarsky... ...	
22	Posadnik	462
22	Voevoda	448
21	Abrek	535
	9 ships.	

ITALY.		
Speed.	Name.	Displacement.
kts.		tons.
20	Aretusa	833
20	Calatafimi ...	833
21	Caprera	833
17	Confienza	768
20	Euridice	833
19	Goito...	812
19¼	Iride...	833
19	Minerva	833
19	Montabello ...	814
19	Monzambano ...	840
19	Partenope... ...	833
18	Tripoli	848
20	Urania	833
20	Saetta	400
20	Folgore	370
23	Agordat	1313
23	Coatit	
	17 ships.	

GERMANY.		
Speed.	Name.	Displacement.
kts.		tons.
19	Jagd...	1230
19	Wacht	
22¼	Komet	931
21	Meteor	
	4 ships.	

UNITED STATES.		
Speed.	Name.	Displacement.

JAPAN.		
Speed.	Name.	Displacement.
kts.		tons.
21	Tatsuta	875
21	*Chihaya*	875
	2 ships.	

EFFECTIVE FIGHTING SHIPS, BUILT AND BUILDING.

Class.	Great Britain.			France.			Russia.			Italy.			Germany.			United States.			Japan.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battleships—																					
1st-Class . .	24	14	38	10	3	13	6	8	14	3	6	9	7	9	16	9	8	17	5	1	6
2nd-Class . .	11	..	11	9	1	10	10	..	10	5	..	5	..	..	..	..	..	..	..	..	..
3rd-Class . .	10	..	10	11	..	11	1	..	1	2	..	2	7	..	7	1	..	1	1	..	1
Total Battleships	45	14	59	30	4	34	17	8	25	10	6	16	14	9	23	10	8	18	6	1	7
Cruisers—																					
1st-Class . .	25	18	43	5	14	19	5	8	13	4	1	5	2	3	5	4	9	13	6	..	6
2nd-Class . .	60	2	62	22	1	23	7	..	7	5	..	5	8	..	8	10	6	16	9	1	10
3rd-Class . .	44	..	44	13	..	13	2	3	5	11	..	11	13	5	18	5	..	5	5	1	6
Total Cruisers .	129	20	149	40	15	55	14	11	25	20	1	21	23	8	31	19	15	34	20	2	22
Coast-Defence Ships .	17	..	17	14	..	14	15	1	16	3	..	3	19	..	19	6	4	10	1	..	1
Torpedo-Gunboats .	34	..	34	21	..	21	9	..	9	17	..	17	4	..	4	..	..	..	1	1	2

CHAPTER V.

British Naval Manœuvres.

Programme.

The following was the programme of the manœuvres of 1900:—

OBJECT.

The principal object of the Manœuvres is to obtain information relative to the working of a fleet, which is composed of vessels of all classes and is fighting for the command of the sea.

The most suitable distance at which to establish a temporary base for a squadron watching a hostile fortified port is a subsidiary question.

The power which cruisers may or may not possess of hunting down and driving torpedo craft into port is another important point.

GENERAL IDEA.

A fleet (B) is divided into two squadrons:—

B1 at Milford.
B2 at Lamlash.

A hostile fleet (A) inferior in battleships to (B) is also divided into two squadrons:—

A1 at Berehaven.
A2 at Lough Swilly.

A hostile reinforcement (A3) which will make A1 + A2 + A3 nearly equal to B1 + B2 in battleships, is expected from the Mediterranean.

The whole of Ireland is hostile territory, and belongs to (A). The whole of Great Britain, from Cape Wrath to the Land's End, the Isle of Man, and the Scilly Islands belong to (B).

The fleet (B) has destroyers.

The hostile fleet (A) has torpedo boats, supported by fast small craft.

The following ports are fortified, and will be placed in a state of defence:—

In Great Britain:—
Milford Haven.

In Ireland:—
Berehaven.
Queenstown.
Lough Swilly.

All other ports including Lamlash are unfortified.

Each fleet will try to obtain command of the sea, that is to say, will endeavour to defeat the other, to shut him up in his ports, and especially to clear the sea of his torpedo craft.

Comments thereon.

Two or three features in this programme invite special comment. It represents a struggle for the command of the sea between two hostile fleets, approximately equal in members and composed of units conventionally equal in fighting strength, so far as battleships are concerned. The British fleet B is slightly the stronger, and the opposing fleet A is at the outset completely overmatched, though it may expect to receive in the course of the operations a reinforcement which will make it nearly equal to B. B has destroyers, A has only torpedo boats. A has three fortified ports, Berehaven, Lough Swilly, and Queenstown, B has only one, Milford Haven. But these fortified ports have no conventional defensive value. They "are fortified and will be placed in a state of defence." In other words, such defences as they actually have will be mobilised and placed under military authority to be defended up to the limit of their actual defensive capacity, but not beyond. If the enemy on either side chooses to

assail them he must take the consequences. His success or failure will be determined, not by any arbitrary assumption of impregnability, but by a decision of the umpires, taking all the circumstances into account and judging them solely on the basis of what would be probable in war. Thus, for the first time in the history of naval manœuvres, the naval and military arms were brought into active co-operation. The sequel will show that the results of this co-operation left a good deal to be desired. It appears to be impossible for soldiers to think and act as sailors do. It is not perhaps to be desired that sailors should think and act as soldiers.

Composition of the fleets.

The two fleets were composed as follows:—

FLEET "A."

A 1.

MAJESTIC (flag).
REPULSE.
DREADNOUGHT.
SULTAN.

A 2.

JUPITER.
RESOLUTION.
EDINBURGH.
CONQUEROR.

A 3.

MAGNIFICENT (flag).
PRINCE GEORGE.
HANNIBAL.
MARS.

CRUISERS.

DIADEM.
BLAKE.
EDGAR.
GIBRALTAR.
IMMORTALITÉ.

GLADIATOR.
TALBOT.
FURIOUS.
NAIAD.
SIRIUS.
APOLLO.
RETRIBUTION.
PHŒBE.

FLOTILLAS.

PACTOLUS, PERSEUS, PIONEER, SPANKER, SHELDRAKE, SEAGULL, SKIPJACK, JASON, HECLA } 42, 49, 50, 59, 66, 71, 76, 77, 81, 82, 83, 84, 63, 64, 68, 74.

MERSEY, PROMETHEUS, SPEEDWELL, SHARPSHOOTER } 51, 52, 53, 55, 57, 58, 85, 86.

FLEET "B."

B 1.

Alexandra (flag).
Colossus.
Rodney.
Howe.
Collingwood.
Camperdown.
Hero.
Thunderer.
Superb.

B 2.

Sans Pareil (flag).
Nile.
Trafalgar.
Benbow.

CRUISERS.

Ariadne.
Blenheim.
Hawke.
St. George.
Galatea.

Vindictive.
Minerva.
Cambrian.
Rainbow.
Melampus.
Andromache.
Medea.
Medusa.

FLOTILLAS.

Brilliant, Alarm, Renard, Leda, Circe, Jaseur { *Fawn, Flirt, Flying Fish, Kestrel, Spiteful, Star, Sylvia, Violet (Portsmouth Division); Angler, Ariel, Avon, Bittern, Cheerful, Cynthia, Mallard, Mermaid (Chatham Division).*

Severn, Antelope, Gleaner { *Leopard, Leven, Locust, Panther, Seal, Shark, Thrasher, Wolf (Devonport Division).*

Orders. The following are the more important of the "General Orders and Instructions" issued for the occasion:—

GENERAL ORDERS AND INSTRUCTIONS.

A partial mobilisation of the Fleet for Manœuvres will take place this year. The vessels mobilised will be attached to the Channel and Reserve Squadrons. They will assemble as soon as ready under the orders of the Flag Officers in command, at Portland and Torbay respectively, and will be formed into two fleets, to be known as Fleet A and Fleet B respectively.

At the time appointed the main fleets will proceed to sea for the usual preliminary cruise, during which the ships will be exercised and anchored at the discretion of the Admiral in command.

Two flotillas composed of cruisers, torpedo gunboats, and destroyers will be attached to B fleet.

The vessels belonging to these two flotillas will assemble at Torbay, and will be organised thus:—

Severn, 2 torpedo gunboats, Devonport division of destroyers.

Brilliant, 5 torpedo gunboats, Portsmouth and Chatham divisions of destroyers.

They will then proceed as follows:—

Severn and flotilla to Lamlash.

Brilliant and flotilla to Milford Haven;

where they will be exercised and will coal, care being taken that all are complete with coal before the commencement of hostilities.

Two flotillas composed of cruisers, torpedo gunboats, and torpedo boats will be attached to A Fleet.

The vessels belonging to these two flotillas will assemble at Devonport, and will be organised thus:—

Pactolus, *Perseus*, *Pioneer*, *Hecla*, 5 torpedo gunboats, Portsmouth and Chatham divisions of torpedo boats.

Mersey, *Prometheus*, 2 torpedo gunboats, Devonport division of torpedo boats.

They will then proceed as follows:—

Pactolus and flotilla to Berehaven;

Mersey and flotilla to Lough Swilly;

where they will be exercised and will coal, care being taken that all are complete with coal before the commencement of hostilities.

Any portion of the Berehaven flotilla can be sent thence to Queenstown, provided that it arrives there and is completed with coal before the commencement of hostilities.

At the termination of the preliminary cruise, the ships forming Fleet A will be formed into three divisions, and those forming Fleet B into two divisions. They will then be detached to the following base ports:—

A1 to Berehaven.
A2 to Lough Swilly.
A3 to a Rendezvous.
B1 to Pembroke.
B2 to Lamlash.

The order to commence hostilities will be sent on the day on which the ships arrive at their base ports.

The period of active operations will last 10 days.

Vice-Admiral Sir Harry Rawson was in command of the A fleet, with Rear-Admiral Albert B. Jenkings as his second in command, the A 2 fleet, when detached from the flag, being placed under the orders of Captain John Durnford, senior officer in the JUPITER. Rear-Admiral Sir Gerard Noel was in command of the B fleet, with Rear-Admiral J. L. Hammet as second in command. A detached squadron of cruisers belonging to the B fleet was placed under the orders of Commodore E. S. Poë in the *St. George*.

The following were the principal "Rules and Regulations" to be observed during the manœuvres :— **Rules.**

RULES AND REGULATIONS TO BE OBSERVED DURING THE MANŒUVRES.

The Manœuvre field is bounded—
on the west by the 20th meridian;
on the north by the 60th parallel;
on the east by the 5th meridian as far as Cape Wrath, by the west coast of Great Britain, and by the meridian of the Lizard Head from that point to the southward;
on the south by the 45th parallel.

As soon as the whole of the ships and vessels composing the two fleets, together with the destroyers and torpedo boats, have arrived in port, a telegram will be sent from the Admiralty naming the hour when hostilities are to commence.

No vessel of any class is to put to sea before the hour named for the commencement of hostilities.

Battleships are to complete with coal on arrival at their base ports before again putting to sea.

All battleships are to be considered equal in fighting power to the *Majestic*.

No rules setting forth the conditions under which ships will be put out of action will be issued. Each case must be decided by the umpires on its merits on the basis of what would be probable in war.

When two or more ships come into action the commencement of the engagement is to be marked by the firing of a gun by one of the ships engaged. During the engagement single guns are to be fired at five-minute intervals by one ship on each side.

When either side considers that he has beaten the other, he should signal "Propose reference to umpires." If the other agrees to the reference the action is to cease. If the other does not agree the action may continue, but not for more than a reasonable time, which is to be determined by the senior officer present. A reasonable time under ordinary conditions would be one hour in the case of battleships, cruisers, and torpedo gunboats, and half an hour in that of destroyers and torpedo boats.

When reference to the umpires has been settled, the senior officer present is to determine what ships on either side are to proceed into port to await their decision, pending which the ships detached are to be considered out of action. The senior officer present must take care to select as far as possible equally from both sides.

If a ship is undoubtedly torpedoed, or manifestly overpowered by a much superior force, the senior officer present may take the responsibility of temporarily putting such ship out of action and ordering her into port for the decision of the umpires. In this case it will not be obligatory to order into port a ship from the opposite side.

Ships put out of action can take no further part in the Manœuvres, but must return to one of their base ports—Milford, Lamlash, Berehaven, or Lough Swilly—flying the Blue Peter at the fore. They are to select a route as far as possible clear of the scene of operation, and are strictly enjoined not to communicate any information to the ships on either side which they may meet on the way.

Colliers, after reaching Milford, Lamlash, Lough Swilly, Berehaven, or Queenstown, are open to capture; the captors can use the coal in them.

Colliers are not to be interfered with after they have discharged their cargoes.

Signal stations are not open to attack by landing parties.

As the 18-inch torpedo cannot be fired at a ship in a peace exercise, a destroyer is to fire a blue light by night or blow her whistle by day at the moment when the torpedo would be discharged, the tube being trained and all adjustments made as if actually firing.

Torpedoes fitted with collapsible heads may be fired at battleships and cruisers, but not at torpedo gunboats destroyers, or torpedo boats.

Torpedo boats are not to paint out their numbers.

As it is assumed that the command of the sea is disputed care, should be taken not to expose vessels needlessly to fire from forts.

Vice-Admiral Sir Compton Domvile and Rear-Admirals C. C. Penrose Fitzgerald and A. D. Fanshawe were nominated to act as umpires. Their instructions were of the usual character, except that Lieut.-General J. F. Owen, R.A., was "nominated by the War Office to act as Military umpire to decide, jointly with the Naval umpires, **Umpires.**

claims arising between the land defences and the ships." Very few such claims appear to have been preferred, but the report of the military umpire and of his naval colleagues on such claims as they were empowered to decide conjointly with him would probably furnish some very instructive reading.

Criticism of the rules, etc.

There is one glaring inconsistency in the foregoing rules and instructions. All battleships were to be considered equal in fighting power to the MAJESTIC, and yet the umpires were required to decide each case referred to them "on the basis of what would be probable in war." If the term "fighting power" be taken as equivalent to the aggregate of qualities which make for success in battle—whether of speed, coal endurance, tactical mobility, armament, or protection—there was no single ship in the B fleet which could be regarded as equal to the MAJESTIC, and there were four ships in the A fleet which could not by any possibility be regarded as equal to the MAJESTIC "on the basis of what would be probable in war." This was at once made apparent during the preliminary cruise of the A fleet. The Channel Squadron proper includes eight battleships, all practically homogeneous in respect of speed, coal endurance, and tactical mobility, and all assiduously trained to a common standard of proficiency in evolutionary exercises suited to their common capacities. They can maintain a continuous sea-speed of 14 knots, they can manœuvre at 12, and are habitually manœuvred at 10 knots. For the purposes of the manœuvres they were reinforced by four additional ships, different in speed, different in coal endurance, different in tactical mobility—all factors of capital moment in the consideration of "what would be probable in war"—and not less different in armament, armour, and protection, though as no ship could fire her guns these latter factors did not count. The effect of this so-called reinforcement was to reduce the extreme speed of the combined fleet to 12 knots at the outside, to reduce its manœuvring speed to 8 knots, and very materially to impair its tactical mobility. Many things would be possible in war to a squadron composed of eight real MAJESTICS which would be quite impossible to a squadron composed of eight real MAJESTICS combined with four putative and only nominal MAJESTICS. It is at least conceivable that a fleet of eight real MAJESTICS might, by taking advantage of their speed and tactical mobility, and in the last resort of their coal endurance, be adjudged on the basis of "what would be probable in war" to have got the better of the whole of the B fleet combined, assuming the latter to be as it actually was; nor is it less conceivable that the reduction of speed, tactical mobility, and capacity to keep the sea involved in the addition of four inferior and heterogeneous ships might on the same

basis have neutralised entirely the supposed advantage to be derived from the increase of numbers. This is a very serious consideration, but the argument seems irrefragable. The more homogeneous a squadron is, the more perfectly it is trained in the qualities and aptitudes which belong to its homogeneous character, the more inexpedient is it to dilute it with a sudden and improvised reinforcement of inferior and heterogeneous ships. Such a policy reduces the whole theory and practice of tactical training to an absurdity. It assumes, in the first place, that the fighting fleets we keep at sea are not strong enough to fight until they are reinforced; in the second place, that such reinforcements may consist of quite inferior ships, newly commissioned, untrained in fleet evolutions, and manned by crews unaccustomed to work together; in the third place, that such reinforcements so organised afford an access of numerical strength which more than compensates for the loss of tactical mobility and the change of tactical method imposed on the fleet so reinforced. If these assumptions are sound, it follows that tactical training at sea as pursued by our fighting fleets is little better than an elaborate and costly method of marking time. If our fighting fleets are not strong enough to fight without being reinforced, they ought to be reinforced at once up to their full fighting strength, even if the reinforcements must consist of inferior and heterogeneous ships. Then, at any rate, they can be trained from the outset in a system of tactics adapted to their composite and heterogeneous character. But to train a heterogeneous fleet in tactics which it can never pursue in war because it will be rendered heterogeneous by reinforcements the moment war is imminent, is practically to declare either that tactical training is worthless, or that newly organised fleets can learn all that is worth knowing about it in the very short interval which, in future wars, is likely to precede the actual outbreak of hostilities. The only sound and logical policy is permanently to maintain our fighting fleets in all respects on a footing of instant readiness for war. This is, perhaps, the chief lesson of the manœuvres of 1900, and it was learnt before the manœuvres began. In its ulterior implications it is probably the most impressive lesson we have had since the manœuvres of 1888.

Hostilities begun.

Hostilities were ordered to begin at 2 a.m. on July 24, and to cease at 2 a.m. on August 3. The telegram from the Admiralty conveying this order was despatched simultaneously to all the fleets in British ports in time to reach them before the hour appointed. But the B 1 fleet, at Milford, was much hampered by fog, which delayed its return to port after the preliminary cruise, and retarded its reception of the telegram. It could not, therefore, leave at the

earliest moment permitted, as some of its battleships, owing to the delay, had not completed coaling, nor had the telegram been received at that time. In spite of the fog, however, it got to sea in the forenoon of the 24th. The other fleets in British ports put to sea at the appointed hour. The A 3 fleet had on July 20 been despatched from Berehaven to a southern rendezvous fixed by the Admiralty outside the manœuvre area with sealed orders determining the time and the direction of its subsequent advance.

Disadvantages of a fixed period.

It has usually been the practice of the Admiralty to fix a period for the duration of hostilites, and this practice was pursued on the present occasion. The practice, though obviously a convenient one for many reasons, is nevertheless open to serious criticism. Manœuvres are too costly, especially in the matter of coal consumption, to be allowed to last for more than a very limited period, nor is it expedient to encourage admirals to dawdle over them. But the topic of "coal strategy," discussed by Captain Bacon in another chapter of this volume, suggests problems which have never yet been adequately or systematically studied, though they will assume immense importance in any future naval war. A fixed period of hostilities eliminates them altogether from the range of instruction to be derived from manœuvres. If an admiral knows that his coal will last as long as the manœuvres will last, he may keep the sea and "put on a brag countenance," as Howard of Effingham said with only just coal enough to take him back to his nearest port at the close of the fixed period. But this is not war—indeed, it is diametrically opposed to "what would be probable in war." In war the relation of coal endurance to the nearest source of supply would govern all dispositions, and this is why fleet-colliers are such indispensable auxiliaries to a mobile fighting fleet. In a fixed period of hostilities, on the other hand, this relation may be practically neglected, as indeed it was. At the close of the period the MAJESTIC had over 1,000 tons of coal in her bunkers, the *Alexandra* little more than 100. But this essential difference in "fighting power" had little or no effect on the dispositions of either side. It is impossible to doubt that in actual war it would have a very material, perhaps even a decisive, effect. The sufficiency and accessibility of his coal supply must ever be the paramount consideration of an admiral who seeks to command the sea. It is impossible to command the sea with ships which for lack of coal are little better than derelicts. The possession of coal and speed is, in fact, the modern equivalent of the weather-gauge. It enables an admiral to force or decline an action at his discretion. Even if speed be no more than equal, the admiral who has the larger coal supply

enjoys an immense advantage. It would for these reasons seem to be the better course to fix no definite period for hostilities, but to allow them to run their natural course until either a decisive issue has been reached or the Admiralty think that they have lasted long enough. Their average duration would probably not be increased by such a policy. In 1894, as recorded in the *Naval Annual* for 1895, the manœuvres were "the shortest and most decisive on record." They lasted little more than 36 hours. In 1900 the operations had not been brought to a decisive issue at the end of 10 days. Yet the period of hostilities fixed beforehand on both occasions was the same —namely, 10 days. Taking the manœuvres of 1894 as the *minimum* and a possible duration of some 15 days as the *maximum*, the average duration would probably be found to be less than the 10 days which seem to be regarded by the Admiralty as a reasonable and normal period. But the gain in actuality and in experience really profitable for war would be incontestable.

Position of A 3 unknown at the outset to both sides.

The situation as it stood at the outbreak of hostilities naturally pointed to the concentration of the detached battle squadrons engaged on both sides. Cruiser and torpedo operations may be considered later. They are essentially subsidiary to a struggle for the command of the sea, which will always be determined by the conflict of battleships, so long as battleships exist. Each side knew that A might expect a strong reinforcement from Gibraltar at a later stage of the proceedings, but neither knew at the outset when it might be expected to enter the manœuvre field. It would seem that Admiral Noel expected that this information would reach him before he left Milford, but it did not, and apparently it was not intended by the Admiralty to do so. It was despatched by the Admiralty simultaneously to both sides early in the morning of July 25, more than twenty-four hours after hostilities had begun. It reached Admiral Rawson at sea off the west coast of Ireland before midnight on the same day, he having the advantage of being at the time in cruiser contact with his signal stations. But as Admiral Noel's dispositions involved the surrender of that advantage, the information did not reach him until the afternoon of July 26. It was to the effect that A 3 fleet had passed Gibraltar at 5 a.m. on July 25, at a speed of 10 knots. As the position of the rendezvous to which A 3 fleet had actually been sent was known to both sides, and was only a few miles to the southward of the southern limit of the manœuvre field, it was thus easy to calculate approximately the time at which A 3 would actually come within the sphere of operations, and with similar approximation the point at which it would enter it. But its course after entering it would naturally be determined by the orders it had

received from Admiral Rawson. These dispositions would seem to be not unfairly adjusted to the probabilities of real war. The movements of an enemy coming from the Mediterranean might quite conceivably elude observation until Gibraltar was reached. But if the Straits were properly patrolled, such a fleet could hardly escape observation in that neighbourhood. It was assumed to have been observed, and to have been immediately reported to headquarters at home. From headquarters it was simultaneously reported to both sides, but, as was natural in the conditions assumed, it reached one side earlier than it did the other. It was stated by correspondents attached to his fleet that Admiral Noel, expecting to be informed before he left Milford of the whereabouts of the hostile fleet "expected from the Mediterranean," had made his dispositions accordingly. It is hard to reconcile this expectation with the wording of the "General Idea" or with the probabilities of the case, as set forth above.

Admiral Noel's plan.

Be this as it may, Admiral Noel, assuming that A 3 was probably well to the northward of Gibraltar when hostilities began, resolved to concentrate his whole force as soon as possible in such a position as might best enable him to prevent or interfere with the anticipated junction of A 3 with A 1 and A 2 combined. The position selected was well chosen on this assumption. A series of rendezvous had been preconcerted skirting the west coast of Ireland, but out of sight of land, and on this line the B 1 and B 2 fleets effected their junction unmolested in the afternoon of July 25, in lat. 52° 9′ N., long. 11° 28′ W. They then proceeded to cruise on the same parallel to beyond the fifteenth meridian, scouting widely in search of the enemy. B 2 had left Lamlash as soon as hostilities began, and, though not unobserved from the Irish coast, had encountered no hostile force.

Its assumptions and their consequences.

Having assumed that A 3 fleet was well to the northward of Gibraltar at the time that he himself left Milford, Admiral Noel seems very naturally to have inferred that Admiral Rawson would probably endeavour to concentrate his three divisions as soon as possible at some point not very far to the westward of the fifteenth meridian nor very far north or south of the fifty-second parallel. Such a point would be conveniently situated as regards both Berehaven and Lough Swilly, and could be reached by A 1 and A 2 without the possibility of being molested or overtaken by B 1 or B 2 at the outset. In point of fact, Admiral Rawson had originally ordered A 3 to advance along the meridian of 15°, and would have met him on that line of advance if his original plan had been carried out. On this assumption Admiral Noel's dispositions would seem to have been well conceived. But it is never safe to make a picture of this

kind. The weak point in it was the unfounded, perhaps unwarranted, assumption as to the position of A 3 when hostilities began. On any other assumption the dispositions adopted were extremely hazardous. It was certain that by starting at the earliest moment and steaming towards each other off the west coast of Ireland A 1 and A 2 could effect a junction before B 2, starting from Lamlash, could reach any point of the parallel on which the junction was effected. A 1 and A 2 combined would then be between B 1 and B 2, in a position much nearer to the latter and in force greatly superior to it. Indeed, until it could get to the southward of A 1 and A 2, B 2 would be altogether in the air, and would run grave risk of destruction. In point of fact, as we shall shortly see, it escaped destruction literally by a hair's breadth.

Admiral Rawson's movements.

Admiral Rawson left Berehaven as soon as hostilities began with all the A 1 battleships, and with the BLAKE, SIRIUS, PERSEUS, and SKIPJACK also in company. He had not received any information as to the whereabouts of A 3 at the time of leaving, nor does he seem to have expected any, thus reading the "General Idea" in a sense different from that which Admiral Noel attached to it. In these circumstances he deemed it inexpedient to sever his communications with his signal stations until he had received this all-important information. He accordingly proceeded to the northward towards a rendezvous off Black Sod Bay which had been given to the senior officer of A 2. Here at 7 p.m. he was joined by the JUPITER, RESOLUTION, APOLLO, PHŒBE, RETRIBUTION, and PROMETHEUS belonging to A 2, and the combined squadron proceeded to the northward, giving the land a wider berth for the night. The EDINBURGH and the CONQUEROR had been ordered to remain at Lough Swilly for the present to save coal, and because they were not required for the immediate purpose which Admiral Rawson had in hand. This was to make a raid on the enemy's northern territory in force greater than the enemy was likely to be able to meet. This raid never came off. It was not perhaps a very hopeful project in any case, nor strategically very discreet as an opening move in a struggle for the command of the sea. It involved a hasty descent on Lamlash, starting from a safe distance at early dawn, with such further naval forays in the estuary of the Clyde as time and circumstances might permit, the intention being to get back into the open again before dark with Lough Swilly as a safe retreat, and a possibility of falling back on the line of advance of A 3 if the enemy were found to have concentrated in the neighbourhood of the North Channel. It might in certain contingencies have effected a useful diversion, but in no probable circumstances could it materially have affected the larger

issues of the campaign. As it never came off, it need not be further discussed. Perhaps it may best be regarded as a rather adventurous way of marking time until the movements of A 3 had been ascertained.

Narrow escape of B 2.

Shortly after the junction of A 1 and A 2 had been effected on the evening of July 25, a cruiser, sent into Black Sod Bay for intelligence, rejoined with the information that four of the enemy's battleships, presumably the B 2 fleet, had been observed in the forenoon from Malin Head at a distance of about 15 miles steering north-west. The course steered indicated nothing beyond an intent to deceive, and this intent appeared to be emphasised by the enemy's showing himself within sight of a hostile signal station without any obvious necessity. Anyhow the ruse, which was perhaps an oversight, was curiously successful. Admiral Rawson did not dispose his fleet during the night in any such formation as, while keeping his forces in hand, might present a wide front to the enemy's possible advance towards the southward; though if he had, with six battleships and eight cruisers in company, an advance in line abreast at moderate intervals so as to cover a front of from ten to twelve miles must have intercepted the enemy and brought him to action at a great disadvantage. About midnight the two fleets passed each other at a distance of some three miles, though neither appears to have observed the slightest trace of the other.

Remarks thereon.

The history of naval manœuvres records no incident more illustrative than this of the inherent chances and accidents of naval warfare. It would be incredible that two considerable fleets could pass unobserved within three miles of each other even at midnight in ordinary weather, if the thing had not actually happened. It is true that the A fleet was not on the look-out for B 2 nor expecting to encounter it, while B 2 had every reason to avoid observation. Still, war is war, and the unexpected is of the essence of war. There is an absent-minded touch about the proceedings of A which it is not quite easy to understand. At midnight on the first day of the operations Admiral Rawson was within three miles of a decisive advantage if he had only known it. He might have known it, and, since he might have known it, it is hard not to think that he ought to have known it. Captain Bacon pointed out in the *Naval Annual* of last year that the most advantageous formation for one fleet which desires to discover another is the line abreast with cruisers disposed on either beam. Had this formation been adopted by A, with intervals suitable to the weather, on the night of July 24, 1900, the B 2 fleet could not have passed unobserved, and the whole course of the operations would have been altered. In all probability ten days would have

more than sufficed to bring them to a decisive conclusion. Here again is a lesson of capital moment to be derived from the manœuvres of 1900—the lesson that nothing must be taken for granted in naval war, and that opportunities missed seldom return.

Further proceedings of A. The appearance of several of the enemy's cruisers in the early morning of the 25th soon led Admiral Rawson to the conclusion that the B 2 fleet must have passed him during the night. The cruisers observed had all been originally attached to the fleet. Some of them got near enough to make out the identity of A, but all were chased away, and all as they retreated made off eventually to the southward. Some time was lost in altering course to deceive them, and the projected raid on the estuary of the Clyde was thereby frustrated, since it required the whole of the daylight between dawn and dusk for its safe and successful execution. It might have been carried out on the following day with a prospect of as much success as is ever likely to attend such operations—a success which in war is moral rather than material, and in manœuvres is apt to be little more than theatrical. But before night information received from the shore, and described as "most important" by the cruiser which brought it —as indeed it was—induced Admiral Rawson entirely to alter his plans. It was to the effect that the DIADEM—which, with a strong contingent of cruisers, had been despatched to Queenstown at the outbreak of hostilities, under orders which will be detailed hereafter —had observed the whole of the B 1 fleet on the morning of July 25 off Brow Head, but out of sight of land, and apparently making for the northward. Brow Head is a signal station in the neighbourhood of the Fastnet. It was thus clear, from these and other indications, that B 1 and B 2 had effected their junction not very far from Berehaven, as they actually did in the position already indicated. This was held by Admiral Rawson to be a very strong position for them to take up, and he anticipated that they would move, as they did, towards some position to the westward of it, intermediate between the coast of Ireland and the western limit of the manœuvre field, in long. 20° W. He thought that, having reached this second position, there were three courses open to them—namely, (1) to steam in full force towards the rendezvous assigned by the Admiralty outside the manœuvre field, in lat. 44° N., long. 14° W., to the A 3 fleet, and endeavour either to bring it to action or to drive it off its preconcerted line of advance; (2) to cruise in the neighbourhood of the position they had reached, scouting widely in all directions so as, if possible, to get touch either of A 1 and A 2 combined or of A 3 advancing to meet them, and to bring one or other to action before they could effect a junction; or (3) to spread their forces as far as they would

go without breach of contract on a line stretching from the Irish coast towards the western limit of the manœuvre field, and scout as actively as possible over the remaining interval. In any one of these contingencies, or indeed in any contingency based on the assumption that Admiral Noel would hold on to the position he had occupied, it was fatal to allow A 3 to advance to the northward along the line originally preconcerted—namely, the fifteenth meridian—and equally fatal for Admiral Rawson himself to move to the southward along the same line. Thus, the first thing now to be done was to endeavour to convey to A 3 fresh instructions adapted to the altered situation and to adapt the movements of A 1 and A 2 to the same situation and to the new instructions sent to A 3. The same cruiser which brought Admiral Rawson intelligence of Admiral Noel's dispositions also brought a telegram from the Admiralty to the effect that A 3 was to be considered to have passed Gibraltar at 5 a.m. on July 25, steaming at 10 knots. At this speed the point where the 15th meridian cuts the southern limit of the manœuvre field could not be reached until some 70 hours after the time named in the Admiralty telegram, and, as Admiral Rawson had received the intelligence within 18 hours of the same time, there was still time if all went well to warn A 3 away from the trap which had apparently been laid for it. Admiral Rawson proceeded forthwith to Lough Swilly, reaching it early in the morning of July 26. Orders had previously been sent to the EDINBURGH and CONQUEROR to get up steam, so as to be ready to join him on his arrival, and, having despatched the orders necessary for the execution of his altered plan, he left the anchorage with his whole force to carry out his own share of the new plan of campaign. Shortly after leaving Lough Swilly he made the following general signal in explanation of his proceedings and intentions: "I consider that B 1 and B 2 must have combined by this time, and that they are some distance from Brow Head. I am now going to try and effect a junction with A 3, an effort which will probably end in a fight. DIADEM'S division of cruisers had been ordered to proceed to lat. 47° 35′, long. 15°, and then run south along the 15th meridian to meet A 3 and direct the Rear-Admiral to meet me at a rendezvous in lat. 47° 35′, long. 20°, about 5 p.m. on Sunday (July 29). A 3 leaves Admiralty rendezvous in lat. 44°, long. 14° at midnight on Friday (July 27), and comes north along the 15th meridian at 12 knots." These dispositions were carried out in the main, and were brought to a successful issue. The A 3 fleet was met early in the afternoon of July 29 in lat. 47° 53′, long. 19° 40′. The DIADEM was not at Queenstown when Admiral Rawson's orders were received there, but the PIONEER was despatched in her stead to convey them. She

encountered the A fleet between 6 and 7 p.m. on July 28 in lat. 47° 50′, long. 15°, and, having delivered her orders, returned direct to Queenstown. The A 3 fleet at once turned to the westward, and joined Admiral Rawson's flag on the following day at the time and place mentioned above. Anticipating that the DIADEM might be unable to carry out her orders Admiral Rawson had on the 27th despatched the BLAKE ahead with similar orders to be carried out with due regard to the position assumed to be occupied by Admiral Noel, and early on the 29th the APOLLO was sent ahead to look out for A 3, now supposed to be nearing the new rendezvous assigned. They both rejoined the flag shortly after the junction was effected, but they do not seem to have accomplished their respective missions, which, in the case of the BLAKE, had been anticipated by the proceedings of the PIONEER, and in the case of the APOLLO by the appearance of A 3 to the north of the appointed rendezvous. The only other change in the plan adopted at Lough Swilly was that the CONQUEROR, which had experienced some difficulty in maintaining the speed of the fleet—10 knots—and was burning her coal at a disquieting rate, was detached on July 28, when the squadron was well past the point at which it was thought that Admiral Noel or some of his cruisers might be encountered, and ordered to steam at easy speed to a rendezvous on the course which Admiral Rawson intended to take on his return, and there wait until she was rejoined by the main body of the squadron. Having now in hand his full force of battleships, Admiral Rawson shaped a course for a rendezvous south of Queenstown, detaching the ARROGANT and the FURIOUS to Berehaven with orders to the DIADEM and her division to rejoin him at the rendezvous, and for the Berehaven flotilla of torpedo boats and torpedo gunboats to concentrate with all despatch at Queenstown. But as this final concentration could not be effected for more than two days, it is time to return to the proceedings of Admiral Noel.

Further proceedings of B.

On receiving the intelligence, which reached him on the evening of July 25, Admiral Rawson had made to himself a picture. He assumed that Admiral Noel had concentrated the whole of the B fleet in a position which he himself regarded as the most advantageous for his adversary to occupy in the whole range of the manœuvre field. The assumption was correct as regards the facts, for Admiral Noel had concentrated his whole sea-going force in the position assigned to him by Admiral Rawson. But it was not correct in regard to Admiral Noel's motives, nor in regard to his estimate of the advantages of the position he had occupied. Reading the "General Idea" in a rather non-natural sense, Admiral Noel had assumed that the A 3 fleet was much nearer the scene of operations

than it actually was when hostilities began On that hypothesis he had further assumed, legitimately enough if the original hypothesis had only been correct, that the rendezvous of concentration of A 1, A 2, and A 3 would be found somewhere in the neighbourhood of lat. 52°, long. 15°, and that he could reach the position in time to anticipate, and possibly prevent, the concentration he expected. With this picture in his mind he took the very hazardous course of ordering the B 2 fleet to the southward in the teeth of a possible combination of A 1 and A 2 in front of it, and though B 2 escaped by a hair's breadth it is almost impossible to exaggerate the risks it ran or the disastrous consequences that might have ensued from the adventure. But Admiral Noel found no trace of his adversary in the position he had occupied. The picture he had made proved to be a false one, and either his imagination failed to show him, or his judgment refused to acknowledge, that the position he had occupied might be turned to account in another way. Finding no enemy where he had expected to find him, he determined to look for him elsewhere. He did not receive the telegram relating to the position of A 3 until the afternoon of July 26, by which time he had returned from his extreme western point some 100 miles in a south-easterly direction. He knew, therefore, that A 3 could not reach the neighbourhood of Ireland for two days at least. He might endeavour to intercept it, but owing to its superior speed he could hardly hope to bring it to a decisive action. He knew from his cruisers that A 1 and A 2 were combined in the north. Having all his battleships with him, he might well feel anxious for the safety of his northern base, which was devoid of all but such defence as could be extemporised from its own resources. As a matter of fact, he had virtually abandoned it for another, equally undefended, which he hoped might escape the observation of the enemy. This may be regarded in some quarters as showing that undefended bases are untenable. The truer inference is perhaps that they can generally, if not always, be extemporised, and that to select and advertise them beforehand is to direct the enemy's attention to them. As matters turned out, Lamlash was of no more use to Admiral Noel than any convenient anchorage in that region would have been. He did not keep his colliers there, but placed them where they were less likely to be found and captured by the enemy. Admiral Rawson partially followed the same policy, although he had three defended bases, when he placed a collier in the Shannon. Such a policy will undoubtedly be pursued in war whenever circumstances permit, as they nearly always will. Almost any secluded anchorage, even in the enemy's territory, will serve the purpose, if it is not covered by guns of position nor occupied in force by troops provided

with field artillery. Neutral territory no doubt presents greater difficulties. But it is probable that even the rights of neutrals will only be respected so far as neutrals are able to enforce them. This is the answer of naval history and war experience, now confirmed by the experience of the manœuvres, to one of the questions propounded as subsidiary objects of the manœuvres—namely, to ascertain "the most suitable distance at which to establish a temporary base for a squadron watching a hostile fortified port." The most suitable distance is one which best serves the purpose of one belligerent and best conceals the purpose from the other. It can only be determined by circumstances when and as they arise. If Wei-hai-wei was contemplated when this problem was propounded the solution was little in its favour. Lamlash was not found so suitable a base for any purpose of the manœuvres as another unknown to the enemy. It was never occupied by a squadron watching a hostile fortified port, and the only hostile fortified port which such a squadron could have watched never had anything in it worth watching. A fleet which seeks to command the sea will rarely be found skulking in its ports.

B goes northward.

Anyhow, Admiral Noel, knowing on the afternoon of July 26 that A 1 and A 2 were combined in the north, and that A 3 was too far to the south to count for the next two days, seems to have thought that the best thing he could do was to follow up Admiral Rawson and try to catch him in case he had entangled himself in an attack on Lamlash and a raid on the estuary of the Clyde. Accordingly he went north, and found—nothing. It was now too late to prevent the junction of A 1 and A 2 with A 3. Where it might take place was still unknown to Admiral Noel. But that it must take place was certain, nor was it less certain that Admiral Rawson having effected it would be able to choose his own time and place for reappearing. His object in reappearing, however, must be to seek the enemy or to compel the enemy to seek him, as might seem to be the most advantageous course. Both combatants being engaged in a struggle for the command of the sea, they must seek each other as soon as they were in a position to offer battle. Whenever that is the case they are certain to find each other sooner or later, and very generally without much delay. The object of scouting is seldom that of finding an enemy who wants to fight: its main purpose is to find an enemy who wants to elude observation, and if possible to bring him to action at a disadvantage. This purpose was no longer open to Admiral Noel. Until Admiral Rawson reappeared he could only place himself in a position to defend the points which he thought his adversary most likely to assail, and there mark time while awaiting further developments.

Still apparently clinging to the belief that the final rendezvous of the A fleets would be to the westward of Ireland, and not to the southward of it, he patrolled the northern part of the Irish Channel between Holyhead and its northern exit, until on August 1 he received off Port Patrick the information from two of his cruisers scouting off the south of Ireland that Admiral Rawson had reappeared in full force off Queenstown.

Comments on the foregoing proceedings.

Thus from July 24 to August 1 two great fleets had, as often happens and must happen in naval war, been playing at cross-purposes, acting, as naval commanders in war often must act, on very insufficient information, misinterpreting each other's motives and movements, taking immense pains to avoid contingencies which never arose, and to avert evils which never even threatened them—it must be added, as regards one, running risks with a light heart which all but proved fatal, and as regards the other missing a splendid opportunity by what at least looks like a piece of sheer inadvertence. It may be thought that Admiral Noel did not fully appreciate the advantage of the position he assumed at the outset. Certainly he did not rate it as highly as Admiral Rawson did, for the latter made certain that, having occupied it, Admiral Noel would stick to it. The final judgment on this issue must depend on the question whether, with the resources at his command, Admiral Noel could have occupied a line some 340 miles in length in such a manner as to make it impossible for a hostile force to pass in either direction without being detected and brought to action. Admiral Noel evidently never dreamt of such a thing. Admiral Rawson, on the other hand, quite as evidently thought it not only feasible but probable. Experiment, perhaps, alone could decide between them. But experimental and systematic scouting is apparently not in favour with the Admiralty, which seems to consider that the art of scouting comes by nature. It certainly does not on land, as we have lately learnt to our cost. Why are we to assume that it does at sea? We take immense pains to exercise our battleships in tactics suitable to their functions, and we prepare an evolutionary signal book from which every captain of a battleship may learn exactly what he has to do, though he can only learn how to do it at sea and on the bridge. But of cruiser tactics, which are much less geometrical, or rather diagrammatic, in character, and depend much more on individual experience and intelligence, we have not even a manual. What is worse, our fighting fleets can seldom study them at all, and can never study them systematically and exhaustively, so short, and latterly so precarious, is the supply of cruisers which the Admiralty in its wisdom allows them. So long as this is the case, the possi-

bilities and limitations of scouting can never be brought to an experimental test, and scientifically determined once for all; and we shall be confronted with the disquieting paradox that one distinguished Admiral thought his adversary certain to do that which the adversary himself, not less distinguished, never seems to have dreamt of doing.

Comment continued.

It may also be thought, perhaps, that a more efficient system of scouting might have enabled Admiral Rawson to get some more definite intelligence of his adversary's movements and apparent intentions before making his wide sweep to the westward. But a fleet which seeks to elude the observation of an enemy superior in force and not inferior in speed must scout with great caution and circumspection. Nevertheless, a more scientific study of the art and practice of scouting than the British Navy is allowed by its rulers to undertake might have enabled the required intelligence to be obtained without compromising Admiral Rawson's safety. Admiral Noel advanced northwards at a mean distance of some thirty or forty miles from the Irish coast. Could he have been observed by one or more of Admiral Rawson's cruisers soon after his intention to go northwards had been disclosed by his movements—that is, before dark on the 26th—the information might have reached Lough Swilly through the signal stations the next morning. Had Admiral Rawson been either there or in the neighbourhood at that time, he would have seen that there was no occasion for him to alter his original plan, that he would probably be able to throw Admiral Noel off his scent and go off to meet A 3 advancing along the 15th meridian as originally arranged. In any case, had he known that Admiral Noel had once abandoned the position which he himself regarded as the most advantageous to occupy, Admiral Rawson might have inferred that he was not very likely to return to it, that he did not perceive its advantages, or did not rate them as highly as Admiral Rawson himself did. There were some risks in taking this course, notably the risk that if the chain of communication failed Admiral Rawson might have been caught in inferior force, or might even have been blockaded in Lough Swilly, as well as the certainty that, after loitering for twenty-four hours off Lough Swilly, it might be too late to take the wide circuit he did, and to warn A 3 in time should Admiral Noel, after all, be found to have occupied a line between the two portions of the divided A fleet. But there were plenty of risks involved in taking the course Admiral Rawson did take. "It is by no means certain," wrote the correspondent of the *Times* on board the MAJESTIC on July 28, "that Admiral Noel has occupied the position attributed to him. It is not certain, though it is highly probable, that B 1 and B 2 had combined at the time that Admiral

Rawson assumed that they had. It is not certain that if combined they have not gone off to intercept A 3 on the southern boundary of the manœuvre field. It is not certain that the DIADEM was in a position to execute the orders sent to her from Lough Swilly; and for this reason Admiral Rawson, yesterday, detached the BLAKE on the same errand. . . . But, again, it is not certain that the BLAKE would be able to elude or evade the cruisers of B. She might escape capture by taking to her heels, but in that case she might be driven so far out of her course as to be unable to reach A 3 in time to prevent the latter running into danger, or to make certain that A 3 will be informed of the new rendezvous before it is too late. In either of the latter alternatives, A 3 will still be in the air, and Admiral Rawson will probably be deprived of the only chance he ever had of obtaining the command of the sea."

The neglect of scouting. On the whole, then, it must be acknowledged that both sides were, or may have been, hampered by the ignorance which the policy of the Admiralty imposes on the whole service of the possibilities and limitations of scouting and cruiser tactics in general. What Admiral Rawson thought it possible and most advantageous for his adversary to do will not be pronounced by any competent critic to be altogether foolish and impracticable. What is here suggested as possible for Admiral Rawson to have done probably no officer in the service will pronounce offhand to be impracticable and inexpedient. Until the art of scouting can be scientifically and systematically studied at sea, opinions the most diverse will prevail and dispositions the most meticulous will be the order of the day. This is not to say, however, that Admiral Rawson's dispositions were meticulous. He took the safest course, but not the most adventurous course. The safest course served his purpose, but it brought him into final contact with his adversary too late for the issue to be fought out. The more adventurous course might have undone him, but it might have given him a better, because an earlier, prospect of success. This, however, is a consideration which arises directly out of the fixed period assigned to the operations, and does not, therefore, apply with equal force to the conditions of real war. There is no fixed period in real war. Time is of importance in war—in some cases it is all-important—but no time is wasted which enables an admiral to avoid a superior enemy and to go into action on the best terms he can with all his available force and at a time and place chosen by himself. Villeneuve did not waste time in going to the West Indies, where reinforcements awaited him. He was worsted in the Trafalgar campaign, not so much because the plan was bad—it was Napoleon's—but because it was feebly executed, and especially because Villeneuve's nerve and

judgment failed him at the critical moment. We may press the parallel even further, though with no reflection on either admiral concerned. We shall see presently that when the two fleets at last met Admiral Noel failed, as Calder did, to carry the fight to a finish, not because he was a man, like Calder, to be content with what Nelson contemptuously called a "Lord Howe's victory," but because he had no alternative. The manœuvres were coming to an end, and his coal was running short. On the other hand, Admiral Rawson, who found himself for the moment at a disadvantage, withdrew, as Villeneuve did, as though to wait for a better opportunity. The better opportunity was denied him by the close of the manœuvres; but no one will suppose that had it been offered him he would have failed, like Villeneuve, to take advantage of it.

Further lessons of the operations.

Nevertheless, if details be discarded, it is impossible not to be struck with the confirmation afforded by the general course of the operations to the teaching of naval history. On this point there is little to be added to the remarks of the correspondent above quoted. Writing on July 30, he said: "We were attempting a combination of great, perhaps of unprecedented, magnitude. The historic principles of naval warfare were reasserting themselves in a most significant fashion. Admiral Noel seemed to have shown that the best way to protect the Irish Channel from naval attack was not to occupy it in force, but to move all his force to any position from which he thought he could best frustrate the designs of his enemy. I commend this fact to the earnest attention of those who hold—there are far too many, I fear, and among them are some of our leading statesmen—that in time of war England would be in danger if our 'great ships' were not to be found in the Channel. As soon as Admiral Rawson became aware of his opponent's movements, did he at once make a descent on the defenceless coasts of England, as some of our amateur strategists, and not a few of our professional strategists of the 'brick-laying school,' would have had him do? Nothing of the kind. He had contemplated a movement into the Irish Channel when he thought the enemy's fleets were there, and hoped to surprise one of them in inferior force. But the moment Admiral Rawson found that the enemy had given him the slip, and had become aware, through the reports of his cruisers, of his own movements and position, the Irish Channel and all it contained was for the moment wiped out of his calculations. . . . He resolved at once to play the great game, to concentrate all his force, and to make the best bid he could for the command of the sea. . . . He himself was at Lough Swilly, his reinforcements were practically only a few hours from Gibraltar, and between the two he held that his adversary had

occupied the most advantageous position to be found in the whole of the manœuvre field—a position approximately equidistant from his own base ports, adjacent to the principal base port of his opponent, and intermediate between the two fleets of the latter, which were practically separated—in time, that is, though not in actual distance—by 1,200 miles of sea." Such are the dimensions which a struggle for the command of the sea may take in an area, large indeed in itself—no less than 425,000 square miles—but insignificant as compared with the area involved in a conflict between two naval Powers of the first rank. And yet there are some who think that the naval wars of the future will be decided in a few days, and conducted mainly in narrow waters by "vessels which do not love the open ocean!"

Proceedings off Queenstown.

Admiral Rawson's return to Irish waters on July 31 was forthwith observed by some of the B cruisers, scouting in the neighbourhood, which after an insignificant skirmish made off, to report proceedings to their own side. The DIADEM, IMMORTALITÉ, TALBOT, EDGAR, NAIAD, FURIOUS, and GLADIATOR had rejoined the flag on the same day. The FURIOUS reported that the B fleet had been observed off Belfast, and this intelligence was confirmed by later intelligence from Queenstown. On August 1 the southern torpedo-boat flotillas which had been concentrated at Queenstown were ordered to join the flag, and Admiral Rawson, having thus gathered all his available forces together, shaped a course for the Tuskar, as though he intended to enter the Irish Channel and go to meet Admiral Noel, who was certain to come south as soon as he heard that the A fleet had reappeared. But this intention, if it existed, was not carried out. The weather had broken, the sea was rising fast, and soon became too rough for torpedo boats to operate with effect, or even to cruise without risk during the night. They were sent in to Waterford for the night, there to await orders. The torpedo gunboats which accompanied them rejoined in the morning, but the sea was still too rough for the torpedo boats, and the torpedo gunboats also were soon ordered to return. Moreover, as the wind and sea rose, the EDINBURGH and the CONQUEROR, which were already nearing the limit of their coal supply, began to labour heavily, and to lose their speed rapidly, the former carrying away her topmast, and the latter burying her bows so deeply that she could not possibly have fought the only powerful and well-protected armament she possesses. She was designed as a coast-defence vessel, with a specially powerful bow-fire. She could not keep the sea twenty miles from the coast in a summer gale, nor, if she could have kept the sea, could she have fought her guns, In other words, she is quite useless for the only purposes she was ever meant to fulfil —sorry purposes at the best—and for all other purposes she is worse

than useless. In company with the EDINBURGH she was ordered to remain at a rendezvous for the night, and to rejoin in the morning. When the morning came the enemy appeared, and then both ships were ordered to proceed forthwith to Queenstown, in order to avoid possible capture.

Comments thereon.

Thus the great Armada, collected and marshalled with such infinite pains to fight for and, if possible, to secure the command of the sea, was gradually dwindling away. When he reached the Tuskar towards evening Admiral Rawson deemed it prudent to go no farther. He was two ships short, destroyers were about, and he must wait for the chance of the weather so far improving as to enable him to put the EDINBURGH and the CONQUEROR again into the line in the morning. Accordingly he steered a south-westerly course during the night, returning towards Waterford in the morning, intending, if the enemy did not appear, to proceed towards Milford and there await him. It is not quite easy to understand the purpose of these movements and proceedings on August 1. The position of the enemy was known, and when Admiral Rawson was off Queenstown it showed that he could not possibly reach the southern entrance of the Irish Channel for at least twenty-four hours. Two courses would then appear to have been open to Admiral Rawson—either to go and meet the enemy with his whole force, or to wait where he was until the enemy appeared. The former was disallowed by the short and failing coal supply of two of his ships; but the latter would have enabled him to coal those two ships at Queenstown, and thereby to recover his full freedom of action so far as coal strategy was concerned. If he could not trust those two ships to take and keep their place in the line, he should, it would seem, have made up his mind to do without them. He would then have had ten ships, eight of which were real MAJESTICS, against thirteen on the other side, not one of which was a real MAJESTIC. The victory was to be won, if at all, not by numbers—for the A fleet all told was inferior in numbers to the B—but by tactics. If it could not be won by tactics it could not be won at all. Is it certain that eight MAJESTICS, together with the SULTAN and the DREADNOUGHT, could not have gained such a tactical advantage over the thirteen ships of the B fleet as would have induced the umpires to award the command of the sea to A? Moreover, the EDINBURGH and the CONQUEROR could probably have obtained at Queenstown coal enough to last them until the end of the manœuvres in a very few hours. That would have enabled Admiral Rawson to have gained a good offing during the night with all his force, and to have rounded the Tuskar before coming into contact with the enemy in the morning, and by keeping as near the Irish

Coast as he could he might have found water smooth enough to enable his less seaworthy ships to manœuvre with effect. He would have encountered destroyers, no doubt. But a fleet which will not face destroyers in the day-time, and even risk encountering them at night, will never win the command of the sea. In any case the great game was to fight for the command of the sea with all his force if he could, with less than all his force if he must. If he was beaten he had done his best. If he was victorious he had done more than could well be expected of him. There can be no real struggle for the command of the sea unless both sides are prepared to fight for it when the time comes. The time could never come again. The manœuvres were to end the next day. In such circumstances a "fleet in being" is a beaten fleet. It had had an opportunity of fighting, and had declined it.

The final stage.

On the morning of August 2 Admiral Rawson, having despatched the EDINBURGH and CONQUEROR to Queenstown, was proceeding with his remaining battleships on his way towards Milford, when his cruisers thrown out ahead announced the approach of the enemy. Admiral Noel had received information of Admiral Rawson's reappearance in Irish waters from Port Patrick shortly before noon on August 1, and at once set forth with all his battleships to engage him, gathering on his way as many of his cruisers, destroyers, and other craft as were within call. The encounter at once took the form of a retreat on the part of A and a general chase on the part of B, which was sustained for hours with unexpected vigour on the part of the latter, regard being had to the legend speed of some of his ships. Admiral Rawson steered a south-westerly course against a strong head wind and heavy sea, and this obliged him to detach the DREADNOUGHT and send her to Queenstown. Being still pressed at a speed of thirteen knots, the SULTAN, which could hardly keep station at that speed, was ordered to make direct for Berehaven, and the remainder of the A fleet, now reduced to eight battleships of the MAJESTIC and ROYAL SOVEREIGN classes, quickened to 14 knots. This was more than B could attain, and about 3 p.m. Admiral Noel gave up the chase, having sustained it with great tenacity for over four hours, and withdrew towards Milford, leaving some of his cruisers to follow A for an hour or two longer. Thus the manœuvres ended, rather ignominiously for A and not very decisively for B. Neither could claim the command of the sea, but B could certainly claim that he was ready to fight for it when A was not. A might claim that if he could have lived to fight another day his "fleet in being" might have become a fleet in action, and possibly a victorious fleet. But as both fleets ceased to exist as opposing forces at 2 a.m. on the

following day, his "fleet in being" really ended its days as a fleet in retreat.

Fast craft operations. Destroyers.

The fast craft operations associated with the operations were of the usual active and varied character. They included the operations of scouts and look-outs attached to the main fleets, of single cruisers engaged both as scouts and messengers, of detached bodies of cruisers, and of torpedo craft. The torpedo boats attached to A were, for reasons which will be considered presently, not actively employed by Admiral Rawson at the outset of the operations, and at their close they were prevented by the weather from fulfilling the purpose for which they had been reserved. The destroyers attached to B were much more active, much more effective, for that reason, and perhaps a little too adventurous. They proved singularly useful as scouts for certain purposes, such as the examination of the enemy's anchorages and possible shelter places, and as fast messengers—"gallopers," as they might be called—but they suffered heavily, and were not very successful in offence, nor always quite trustworthy in observation. On one occasion a destroyer was said to have passed, at night, six friendly battleships steaming without lights, and to have mistaken them for hostile torpedo-boats. On another, a destroyer was literally caught napping by a portion of the A fleet off Lough Swilly, and appeared to be quite unconscious of an enemy's presence until fire was opened on her. Six destroyers in all were put out of action by the umpires as having been captured, sunk, or otherwise destroyed. But twenty-six other claims were made, several being duplicates, all of which were disallowed by umpires. On the other hand, the claims made by destroyers were not numerous, nor was any ship adjudged to have been torpedoed. The Les Reaulx, a so-called distilling ship, of pitiful speed and contemptible condensing capacity, was claimed as a prize by the *Leopard* off Lough Swilly on the morning of the first day of hostilities. This claim was allowed by the umpires, as was inevitable, but the Les Reaulx was no great loss to the A fleet. Her storage capacity was 853 tons, but she could only distill some twenty-seven tons daily, which is not much more than half as much as a MAJESTIC could accomplish for herself, and she could only pump about ten tons an hour. She had left Berehaven on the morning of July 22, with orders to proceed to Lough Swilly, which, with very moderate speed, she ought to have reached before hostilities began at 2 a.m. on July 24. As she failed to do this, she naturally fell an easy prey to the first destroyer which arrived off Lough Swilly. The incident proves—not that properly equipped fleet-auxiliaries are a mistake—but that inadequate fleet-auxiliaries are more than useless. For the rest, the *Seal*, *Wolf*, and *Locust* were adjudged to have dis-

abled the SPEEDWELL off Lough Swilly, though whether by torpedo or gunfire is not clear, but the claims of the *Kestrel* to have torpedoed the GIBRALTAR, and of the *Wolf* to have torpedoed the PROMETHEUS, were disallowed. These, with a disallowed claim of the *Cheerful* to have destroyed some searchlights at Queenstown, were all the claims presented by destroyers. They contrast significantly with the claims allowed against them, and still more with the claims presented against them but not allowed, especially when it is considered that for many days during the period of hostilities the whole of the battleships of the A fleet and many of its cruisers were altogether out of the range of destroyer operations. As a menace the destroyer is exceedingly formidable—indeed, against torpedo boats its menace is little short of a positive deterrent; as a messenger, and for certain purposes as a scout, it is within certain limits almost invaluable. But its offensive power against large ships well handled and keeping a sharp look-out would seem to be still in some measure undetermined. The power sometimes imputed to it in this respect is perhaps exaggerated. If it is not, if destroyers can deny access to narrow seas to powerful and well-equipped fleets, it is clear that we shall soon have to revise the current estimates of the relative value of different elements of naval force. If the destroyer is to this extent master of the battleship, either singly or as flotilla against fleet, then the battleship at once becomes not only a ship that loves the open ocean, but a ship that must fight there if at all. Yet the experience of the manœuvres, as far as it goes, seems to make against this view of the matter. The DIADEM and her division of cruisers were in the Irish Channel from the morning of July 27 to the evening of July 28, being about midway between Holyhead and the Isle of Man at midnight, and yet they were never attacked by destroyers, though they must have encountered several, as more than one was claimed by them. On the other hand, the temerity too freely displayed by destroyers during the manœuvres in remaining in daylight within reach of the guns of larger ships, even at very long range, might tend in actual warfare to their rapid disablement and extinction.

Torpedo boats.

It has already been said that Admiral Rawson kept his torpedo boats in hand, intending to use them, if he could, in his final onslaught on his adversary. His action in this respect is perhaps open to criticism, and it certainly diminished his chance of finding the numbers of the B fleet when he did encounter it reduced to an equality with his own, if not to a position of inferiority. But the question is quite open to argument, as was shown at the time by the correspondent already quoted: "He thought he could better employ his torpedo boats in wearing out the enemy's destroyers in a prolonged and fruit-

less search for a prey which persistently refused to show itself, than in exposing them to a conflict in which they were so heavily handicapped. For such a policy there is not a little to be said. Torpedo boats, not being an independent and self-sufficient element of naval force, are perhaps little adapted to take an active part in a struggle which can only be decided by the conflict of sea-going ships at sea. Their effective range of action is very limited; they can do little or nothing within that range unless they know exactly when and where to find the enemy they are seeking, and even within that range they are no match for destroyers. It is not much use to send torpedo boats to sea on a roving search for enemies who may possibly come within their very narrow range of action, and who, if they do so come, will almost certainly be accompanied by destroyers. Naval warfare in all its initial stages is at all times very much like looking for a needle in a bundle of hay, but a torpedo boat, which can only work at night —it is a nocturnal animal, small, indeed, and very venomous, but with very indifferent noctural vision—is a very poor agency for the prosecution of such a search; and it is the special prey of other nocturnal animals, larger and more agile, endowed with a keener vision and a much more deadly sting. Hence the policy of keeping torpedo boats in hand until the struggle for the command of the sea is decided—or, at least, until issue is finally joined—is by no means so pusillanimous or so ill advised as it might at first sight appear to be." Acting on these views, Admiral Rawson kept his torpedo boats in reserve until the last moment, when he hoped for an opportunity to employ them with effect; but, as we have seen, the weather entirely frustrated his design. One singular incident may, however, be mentioned as tending to show that the torpedo boat still shares with the destroyer the power of operating on occasion by means of menace. The *Minerva*, scouting off the west coast of Ireland, got amongst a fleet of fishing boats off the Skelligs, on the night of July 27. Mistaking them for torpedo boats, and remaining among them apparently for some hours, she persuaded herself that she must have been torpedoed, and, loyally hoisting the "Blue Peter"—the signal for being out of action—she proceeded quietly to Milford, there to await the decision of the umpires. As no torpedo boats were nor, under Admiral Rawson's orders, could have been engaged, the decision was naturally given in her favour. But the action of the *Minerva* was remarkable, not to say quixotic. Such an incident could not, of course, happen in war, but, even in war, cruisers which mistake fishing boats for torpedo boats are likely to meet with strange adventures, and to play the enemy's game rather than their own.

Cruisers.

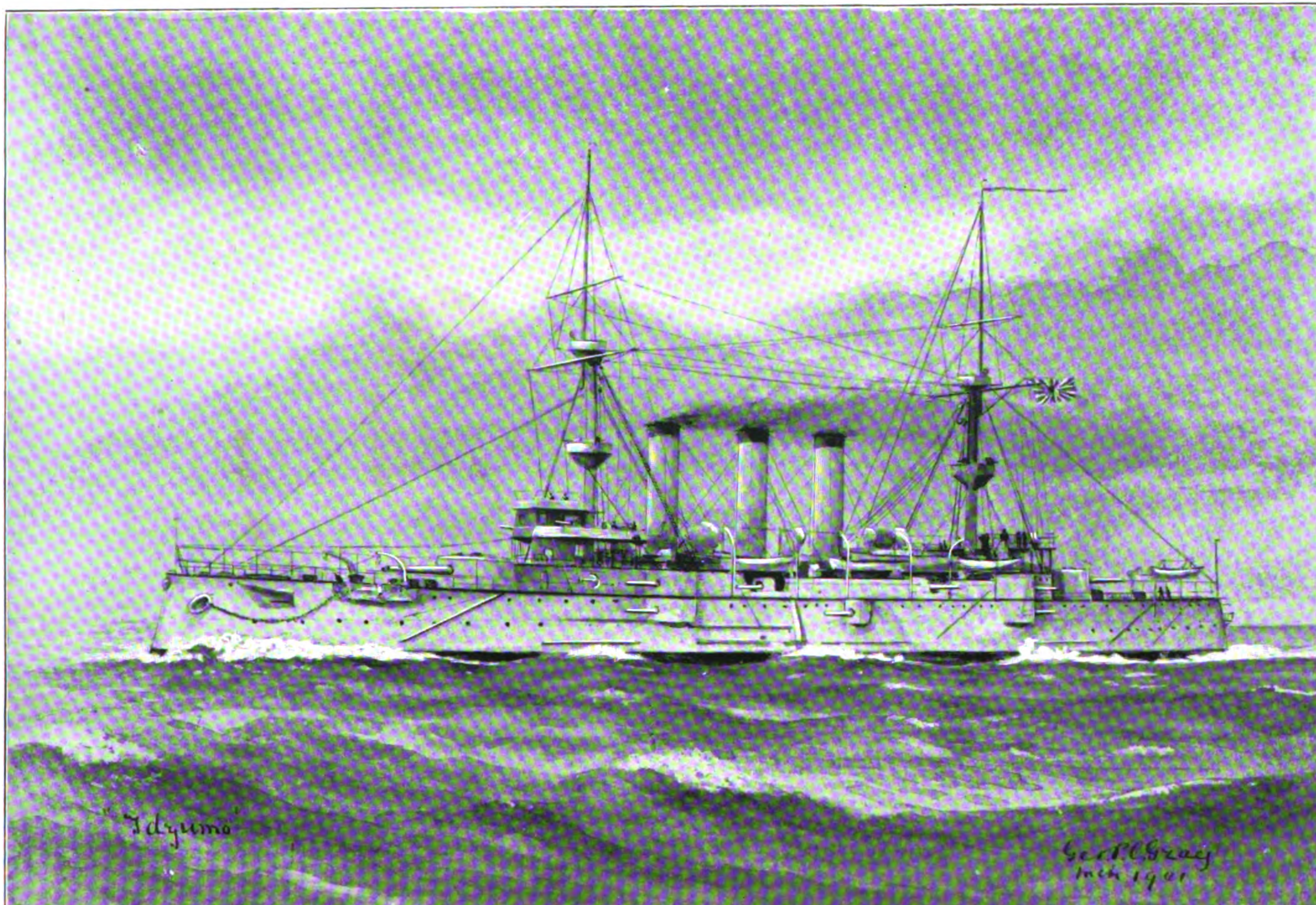
It is impossible here to follow the cruiser operations in all their details. But one important and very instructive engagement between two opposing divisions of cruisers is entitled to special notice. At the outset of hostilities, Admiral Rawson had organised a very powerful division of swift cruisers, consisting of the DIADEM, IMMORTALITÉ, TALBOT, EDGAR, GIBRALTAR, and NAIAD, and instructed it first to get touch, if possible, with the enemy's fleet, and to report its strength and presumed movements to himself, and afterwards to act as a flying squadron preying upon the enemy's commerce, harrying his torpedo craft, and generally doing as much mischief as it could. The first object was, as we have seen, speedily accomplished, and the information obtained proved of great importance to Admiral Rawson, and determined the whole course of his proceedings. In obtaining it the DIADEM and her consorts ran some risk of a serious encounter with the B 1 fleet at an early stage of the proceedings, but Admiral Noel's claim was disallowed by the umpires. Subsequently an incursion was made into the Irish Channel, and here, the TALBOT being temporarily detached, the division came into conflict on July 28 with a similar division organised by Admiral Noel under Commodore Poë, consisting of the *St. George*, *Ariadne*, *Vindictive*, and *Hawke*. On observing the enemy, the DIADEM and her consorts at once gave chase, altering course eight points to port together so as to come into line abreast astern of the enemy. The IMMORTALITÉ was ordered to take the starboard position, and gradually to edge away to starboard, so as to prevent the enemy making off in that direction, though it is not easy to see how a single ship could have that effect, or could avoid weakening her own force by taking up a more or less isolated position. It gave her, however, the opportunity of raking the enemy's whole line as he advanced. Commodore Poë, seeing that an action could not be avoided, inasmuch as the *Vindictive* was temporarily disabled in one engine, and could maintain no higher speed than some twelve or thirteen knots, decided to take his chance, and, being in line ahead, he altered course sixteen points to starboard in succession so as to engage four of his enemy's cruisers before the IMMORTALITÉ could support them. As he neared them he altered course to starboard again, so as to pass across their front, and, seeing this movement, the DIADEM and her three followers altered course in succession to starboard, so as to take up a position parallel to Commodore Poë's line, the IMMORTALITÉ ultimately falling in astern. By this movement the NAIAD, the rear ship of the DIADEM'S line, was brought under the fire, at close range, of each of Commodore Poë's four ships in succession, and was subsequently adjudged by the umpires to have been sunk. As the evolution adopted by the DIADEM'S

division was adjudged by the umpires to have produced this result, it must clearly have been a faulty one, though how that result could have been avoided must be left to professional tacticians to decide. The incident is instructive as showing that superior strength may often be neutralised by the superior tactics of a weaker force, and it may perhaps be added that no theoretical study of tactics is likely to enforce this lesson so cogently as actual experience at sea.

Military co-operation. It only remains to say a few words about the proceedings of the military authorities at the ports where the military defences in their charge were brought into co-operation with the naval forces engaged. As the instructions on which they acted have not been made public, it is only possible to judge by results. Of the state of preparation in which the military defences were found, and of their adequate adaptation to the requirements of the case, it must suffice to say that the correspondents afloat gave no very reassuring account, though no doubt the officers in charge spared no pains, and did their best with the materials and resources available. But, to judge by the reports from both sides, they showed a very imperfect grasp of the requirements and conditions of naval warfare. "Their zeal is unimpeachable," wrote the correspondent already quoted, "but it is not always according to knowledge, certainly not according to naval knowledge. When they get hold of a searchlight and play it over a minefield entrusted to their charge they . . . work it in season and out of season, more especially when friendly ships are navigating an intricate and difficult passage—as actually happened when the A 1 fleet left Berehaven at the outbreak of hostilities, and . . . when the B fleet returned to Berehaven at their close. It never seems to have occurred to them that a navigator cannot see his leading marks with a searchlight blazing into his eyes. . . . I have already mentioned how the Furious, returning in urgent haste to Berehaven, failed altogether to attract the attention of the military authorities until she was preparing to anchor, when they incontinently fired on her, and how Admiral Rawson was kept waiting for nearly an hour off Dunaff Head, in Lough Swilly, before he could get permission from the military authorities to go any farther. I have now to mention that the Sultan experienced exactly the same treatment as the Furious when she returned to Berehaven at the close of the hostilities, and I dare say the same thing would have happened to the whole of the A fleet if the war had not been over for some hours before it put in an appearance. All this is amusing enough, and I have not attempted to treat it too seriously. But it has its serious side. It is at least serious enough to show that military officers are not to be trusted with the land defences of a

naval port unless they possess some rudimentary knowledge of the conditions and requirements of naval warfare. The moral seems to be that inasmuch as naval and military forces must co-operate on many occasions in war, the conditions which make for their effective and intelligent co-operation should be systematically studied beforehand, so that military officers may learn to understand what they can do and what they cannot, what they must do and what they must not, when engaged in the local defence of a naval port. For lack of this knowledge they are apt to do many very foolish things, and to try to do many quite impossible things. But systematic study and intelligent forethought are not in fashion in this country. Our faith is rather in the makeshift and the make-believe, in the improvised and the ill-co-ordinated. It is a very costly faith, and withal a very dangerous one. We squander millions where pence would be thrown away, and even the pence we wisely spend are often wasted for lack of knowledge.

James R. Thursfield.



"IDZUMO,"

JAPANESE FIRST CLASS ARMOURED CRUISER

CHAPTER VI.

Marine Engineering.

During the past year the chief event of interest in the field of naval engineering has been the appointment by the late First Lord of the Admiralty of a committee to inquire into the working of the Belleville boiler in the Royal Navy. This alone would be sufficient to again bring forward the boiler question to a position of first importance, for the marine engine, as applied to warships, has undergone no change of any magnitude during the last twelve months, if we except the Parsons steam turbine. Another boiler event of considerable importance to naval engineers was the issuing last summer of an Admiralty "Memorandum respecting Water-Tube Boilers in H.M. Ships" (C.D. 250). This report chiefly dealt with the extensive trials of the Highflyer and the Minerva. As the data embodied in it are among the most important that have yet been published in connection with the performance of water-tube boilers of the large tube type, it is necessary to refer to it here at some length. **Admiralty Boiler Committee.**

The memorandum points out that "the use of small tube boilers has hitherto been confined in the Royal Navy to third-class cruisers and smaller vessels, where the importance of securing high speed on small dimensions justifies the acceptance of boilers which have a shorter life than is desirable for large ships." So far as the British Navy is concerned, that is perfectly true, but other countries have been somewhat more progressive. **Admiralty Memorandum on water-tube boilers.** For instance, Armstrong, Whitworth & Co. have now in hand for a foreign Power two small ironclad ships which are to have all boilers of the Yarrow type. As the same firm completed some time ago a cruiser of 12,500 horse-power also with the same description of boilers, it may perhaps be safely concluded that the type gave satisfaction. **Foreign war vessels with small tube boilers.** The Dutch Navy authorities have had considerable experience with this boiler. In a former issue of the *Naval Annual* particulars were given of three cruisers of 10,000 horse-power that were built in Holland. In each of these three-fourths of the power was supplied by Yarrow boilers, and one-fourth by boilers of the ordinary cylindrical type. The experiment appears to have been also satisfactory, as since then three cruisers, each of 10,000 horse-power, have been completed for this Government, and three armoured vessels

are now in hand. The Swedish Government have also built, or are about to build, seven cruisers and armoured vessels, the most powerful being of 12,000 horse-power. The Austrian Government have three cruisers built and one building, the latter of 13,000 horse-power, besides an ironclad in progress of 14,000 horse-power, and I understand two more armour-clad vessels are being designed. This would give a total of twenty-six vessels having small tube boilers of the Yarrow type, excepting the three mentioned which have one-quarter of their steam-generating plant in ordinary boilers.

The Thornycroft type of small tube boiler has also been placed in foreign war vessels, some of them being of the largest and most powerful type. They include two German battleships and five cruisers, two first-class battleships (the Missouri and the Ohio) of 16,000 horse-power each for the United States Navy, and two coast-defence ships for Denmark.

The list of vessels above-named does not include torpedo craft, although destroyers are always very high-powered, some far more so than much bigger vessels. It need hardly be said that all torpedo craft are now fitted with water-tube boilers of the small tube type. Probably other small tube boilers of other patterns, or of other names, have been placed in large vessels, but one need not go beyond the two pioneer types of British small tube boilers to show that confidence is being gained in their use.

Tubes. Returning to the Admiralty memorandum, we find detailed reasons given why the small tube class has not hitherto been favoured for large vessels. The first is that "the tubes of small tube boilers are much thinner than those of the large tube types, and the maximum power of the boilers is obtained by forcing, which also tends to shorten their life." Of course both these statements are incontrovertible, but, in regard to the first, it may be said that the smaller diameter tubes have purposely been made of thinner metal in order to attain special ends (chiefly lightness), for which it is worth sacrificing other qualities in exceptionally high-speed vessels. It is to craft of this description that the Admiralty experience of small tube boilers has been almost entirely confined. The small tube boiler is, however, so very much lighter, power for power (as was shown in last year's *Naval Annual*), than any other type that something in regard to the quality of lightness might easily be sacrificed to durability; the metal of the tube might, therefore, be materially thickened up, and yet leave the advantage in weight on the side of the small tubes. No doubt the gauge of metal in small tubes cannot be brought up to an equality with that of the large tubes in Belleville and kindred types, but there are other things

besides thickness of metal which are conducive to the longevity of a boiler—circulation being one of the most important.

Forced draught.

In regard to the second objection above mentioned—that the maximum power is obtained by forcing—that is true of all boilers capable of being forced. One of the greatest merits of the small diameter, direct-tube type is that it can be forced without damage. This is a most valuable property in a warship boiler, and might easily decide the fate of an action. It is something that the naval commander would always have in hand for an emergency, when the shortening of the life of the boiler would be the merest bagatelle.

Admiralty policy.

"The Admiralty policy has been," the report continues, "to consider the Belleville boiler, in which they have had more experience than with any other type of water-tube boiler, as the approved type for large ships, treating other types as experimental until they have shown that they possess some distinct superiority." When the water-tube boiler, in some form, was forced on the Admiralty authorities, the Belleville boiler was the only one with which extensive sea-going experience had been gained, and the engineering advisers of the Board could hardly have done otherwise than recommend its adoption. Other types of large tube boilers have since been tried. "Two long series of trials have been carried out," the report states, "in the Sheldrake and the Seagull with the Babcock and Wilcox and the Niclausse boilers respectively, for comparison with those previously carried out on Belleville boilers in the Sharpshooter." We are told that: "Each of these boilers has its advantages and drawbacks, but the trials showed no decided advantage of either over the Belleville boiler. The experiments were, however, considered to justify further trials of both on a larger scale, and it has been decided to fit the Babcock and Wilcox boiler in one of the new sloops, and possibly in one of the two new second-class cruisers, and the Niclausse boiler in a new sloop and in a first-class cruiser of the Monmouth type." *

The Admiralty authorities deserve great credit for their open mind in this matter, and the step completely refutes the accusation, very unfairly brought against them, that they are "wedded" to the Bellevile boiler. The Niclausse type has tubes large in diameter and approximately horizontal; and in this respect it resembles the Belleville boiler. The tubes in the Babcock and Wilcox boiler are at a standard inclination of 15 degrees from horizontal. In some

* It has since been stated in the House of Commons that, "The Challenger, the sister ship to the Encounter, is being fitted with Babcock and Wilcox boilers for comparison with the Belleville boilers in the latter ship. Babcock and Wilcox boilers are also being fitted in the Espiegle and Odin. and Niclausse boilers in the Suffolk, sister ship to the Cornwall, and in the Merlin for comparison with other ships of the same classes fitted with Belleville boilers."

other important points, however, both boilers differ materially from the Belleville type, and as they are about to be tried in His Majesty's Navy, it is well perhaps these differences should be here explained.

Belleville. In the issues of the *Naval Annual* for 1897 and 1898, sectional views of the Belleville boiler were published, and the principle on which it operated was set forth. It is hardly necessary to go over

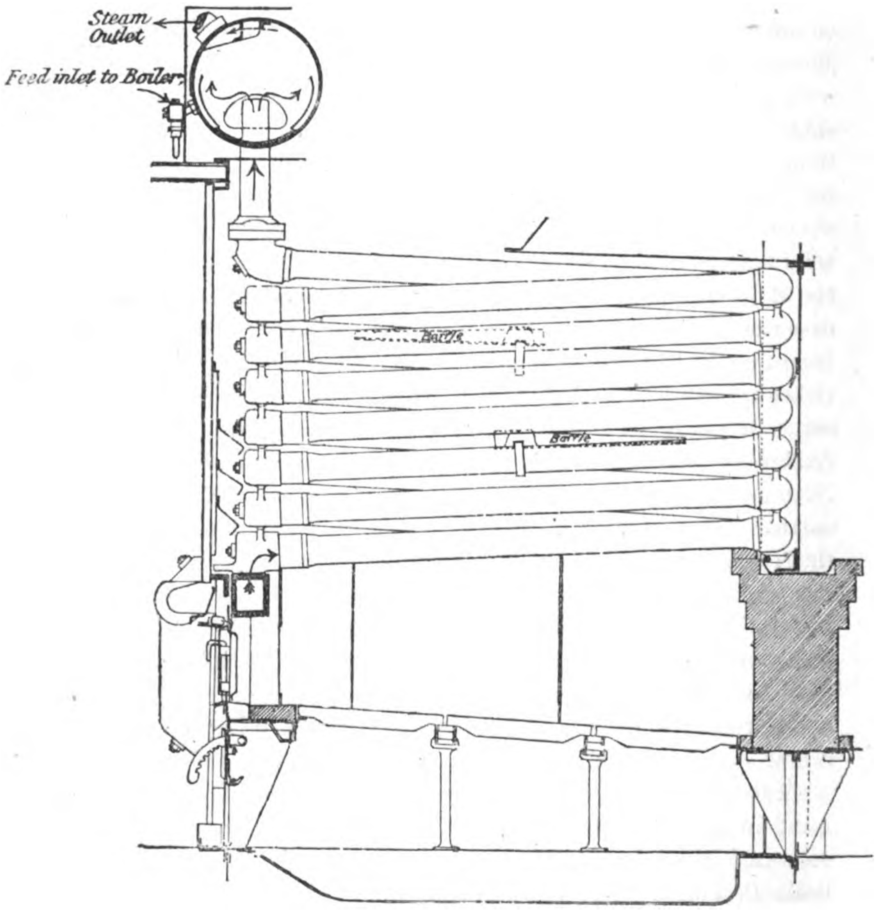


Fig. 1.

the whole ground again, but for convenience of reference a few words may be said about the circulation of water and steam in order to compare the Belleville with the two other boilers mentioned. Fig. 1, on this page, is a sectional view of a Belleville boiler of the economiser type, but the economiser has been left out, as it does not affect our present description. In the view only one element of the boiler is

shown, this being a side elevation; but it will, of course, be understood that the whole boiler consists of a number of elements placed side by side. The feed water is pumped into the drum at the top left hand corner, and from thence it descends by a vertical pipe, not shown in the engraving, to the bottom end of the zig-zag of tubes which form the steam-generating element. From thence the water ascends through the element—which is in the course of the flame and heated gases—and is more or less evaporated during its progress, the steam and evaporated water being discharged into the drum. The steam is taken to the engine, and the surplus water mixes with the fresh feed water and falls through the vertical pipe to be again passed through the element.

It is as well to repeat here that the success of a water-tube boiler depends largely on the vigour of the circulation of steam and water in the generating tubes; and in the Belleville boiler this circulation is a good deal checked by the length of tube in the element, and by the numerous sudden bends at the junctions of the various lengths. So much is this the case that non-return valves are placed near the bottom end of each element to prevent a reversal of the circulation.

Babcock and Wilcox.

The Babcock and Wilcox boiler is shown diagrammatically in Fig. 2, on page 124, and an engraving of a complete boiler is given in Fig. 3, on page 125. Water is pumped into the drum at the top and falls by gravity through the short length of pipe, shown in Fig. 2, and passes to the header, into which the tubes are fixed at one end. The other ends of the tubes lead into the back header. It will, of course, be understood, that the whole boiler is composed of a number of vertical rows of tubes, placed side by side, each one corresponding to the element of the Belleville boiler. The headers are rectangular in cross section—square tubes they might roughly be called—each vertical row of generating tubes having its own back and front header. It will be seen, therefore, that the water and steam have not to pass through a long, tortuous passage exposed to the heat of the furnace, as in the Belleville boiler. For instance, a given quantity of water may pass from the drum into the front header, fall right to the bottom, and then enter the lowest tube, through which it would flow to the back header, and then ascend, as water and steam, to pass back into the drum by the two top tubes. Other water may pass through the top row of tubes, and other quantities again through the intermediate tubes. It will be noticed that above the two bottom tubes a space is left where two other tubes might have been placed. This is done in order to provide a combustion chamber, where unconsumed gases may be burnt before they are cooled below the temperature of combustion. This is a detail of

practice that need not be considered in studying the general principle of the boiler. In Fig. 2 the course of the products of combustion is shown by feathered arrows. It will be seen that baffle plates of fire tiles are placed among the tubes to prevent the gases from passing too directly to the chimney. In this way they are made to distribute their heat more evenly over the whole of the tube surface. The direction of water and steam circulation is shown by dotted arrows.

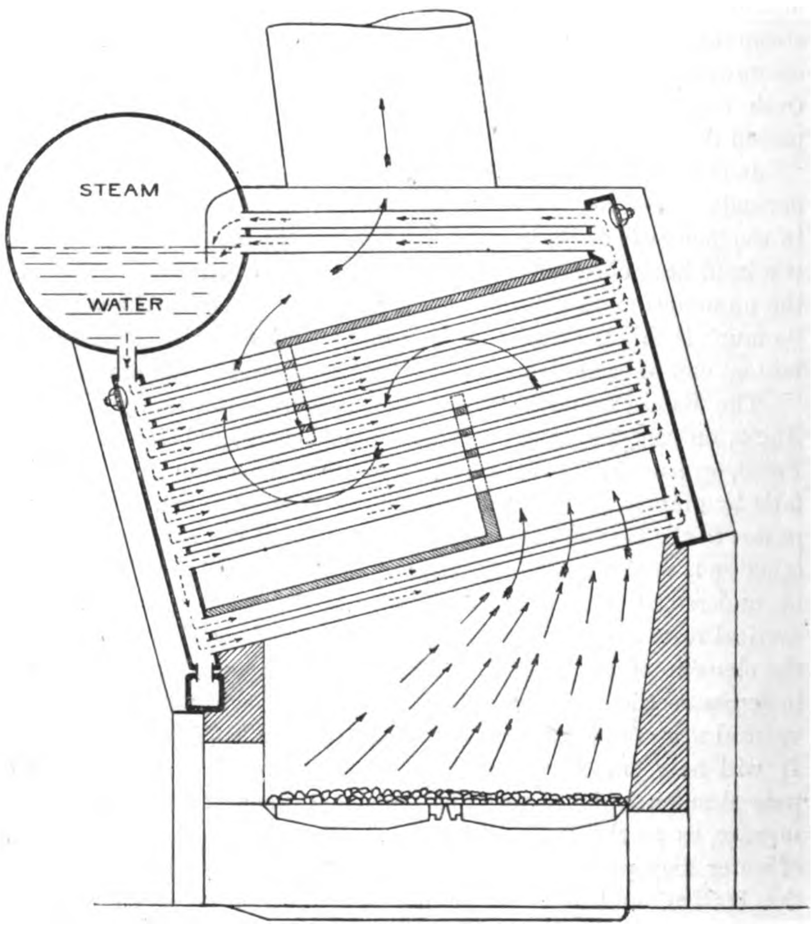


Fig. 2.

Circulation.

In this boiler circulation is maintained by the difference between the specific gravity of a column of solid water in the drum and the front header, and the specific gravity of a column of mixed water and steam in the inclined generating tubes and the back header. In the Belleville boiler, any water entering at the bottom of an element must necessarily pass through the whole length of the tubes forming

that element, for there is no other road open to it; though it is possible any one element might refuse to take water—from some untoward cause,—because the feed distributing pipe is common to all elements. The Babcock and Wilcox boiler stands on a different footing. Thus, if the feed were limited, all the water might descend

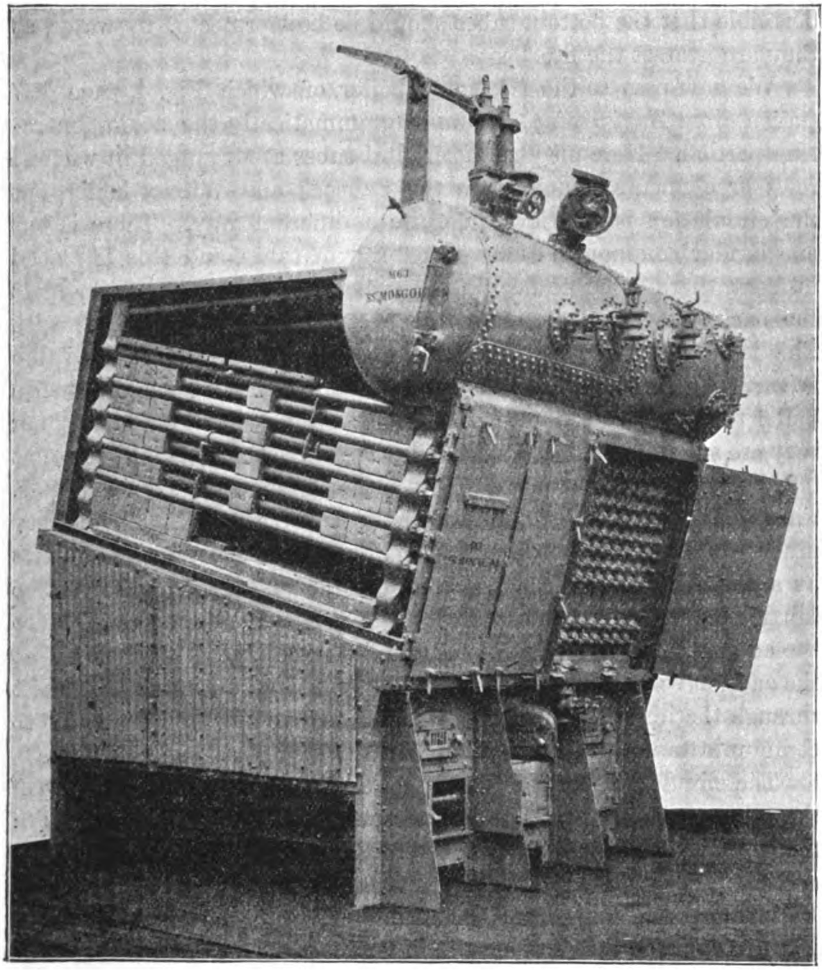


FIG. 3.

by gravity to the bottom of the element, and pass only through the lower tubes, leaving the upper ones bare. On the other hand, it has been objected in regard to this boiler that if the circulation were very rapid, it is conceivable that the water would take the shortest course and switch off from the header into the first opening it came to, which would be the upper rows of pipe. What actually

occurs is a matter of conjecture, though the conditions might be laid down theoretically by mathematical calculation. Probably the lower tubes would always have the advantage owing to the increased head, due to their position, available for circulation. This would be felt to the fullest extent if feed were restricted, and the ratio of water to steam in the column in the back header were lowest. Naturally it is desirable that the bottom tubes should be best protected by water, as they are nearest the fire.*

Niclausse. We now pass to the Niclausse boiler, of which Fig. 4, page 127 (taken from *Engineering*), shows diagrammatically the steam-generating portion. Here also the horizontal tubes are arranged in vertical rows or elements, much as in the Babcock and Wilcox boiler, but the circulation is provided in quite a different way. There is but one header common to each vertical row of tubes, and this is placed in front, there being no back headers at all. The tubes are closed at the back end, being therefore free to expand and contract at will. This is an advantage that the Niclausse boiler possesses. Its value is variously estimated; but it may be stated that in the Belleville boiler tubes have been pulled out of the junction boxes into which they are screwed. This is attributed to defective threads; and no doubt it is better to use expanded joints rather than threaded tube ends. The front header—the somewhat complicated structure of which is very much simplified in the diagram—is divided vertically into two parts by a diaphragm, thus forming an inner and an outer chamber. The inner chamber communicates with the generating tubes exposed to the action of the flame and hot gases. These larger tubes, closed at the ends, have inside them smaller open-ended tubes, which pass right through the inner chamber and also through the diaphragm so as to communicate with the outer chamber.

The circulation here is due to the difference in specific gravity of the column of water in the outer chamber and the specific gravity of the column of mixed steam and water in the inner chamber. The cycle, which is easily followed by means of the arrows in the diagram, is as follows:—Water from the drum falls into the outer chamber, and from thence passes along the inner tubes. Out of these it flows, coming back along the annular space formed between the walls of the inner and outer tubes. Here the steam is generated, and the mixture of water and steam passes into the inner chamber, and from thence back into the drum. The steam is taken to the engine, and the unevaporated water falls again, to pass once more through the

* Since the above was written I have been informed that model experiments show that the harder the boiler is driven, with such steam pressures as could safely be carried in glass tubes, the more brisk the circulation in bottom tubes becomes.

tubes along with the new feed-water. All horizontal tube boilers possess the defect of their type in regard to circulation. With vertical tubes the steam as generated can pass upwards to the steam drum at once; in horizontal tubes it ascends to the top of the tube, where it is inclined to stop.

The Thorny-croft-Marshall boiler.

Mr. Thornycroft, in conjunction with Mr. Marshall, of Newcastle, has recently introduced a new description of water-tube boiler, which is illustrated in Fig. 5, p. 129. It will be seen that there is here a single header or flat chamber into which a number of pairs of tubes are expanded at one end. These pairs are joined at their opposite ends by junction boxes. There is the usual drum into which the feed water is pumped, and from thence descends from the two pipes shown

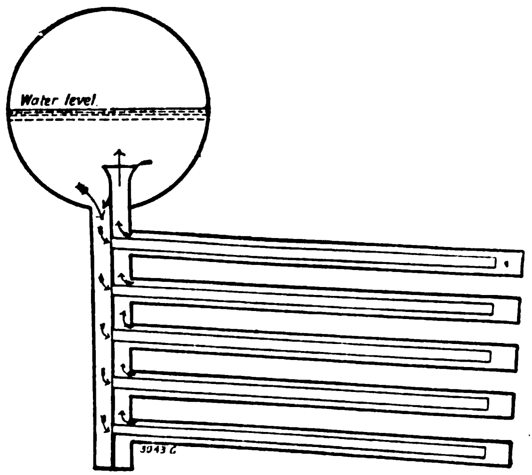


Fig. 4.

into the header, from whence it is distributed to the tubes. The inclination of these being upward, the tendency of the steam is to pass to the flat chamber, and having there risen to the top, it will flow into the drum by way of the pipe which enters the drum above water level. The tubes in this boiler are 3 inches in diameter, and the steam drum is of large capacity, the proportion adopted being about ·04 cubic feet per I.H.P. The flat chamber or header is also of fair proportions, being about 9 inches deep.

The design of the boiler is ingenious, but it will not take the place of the older Thornycroft type. It would hardly be suitable for forcing, as the head available for circulation is small. The tubes, though bent, are open to inspection throughout. At the back end they are expanded through the inner wall of the flat chamber, on the outer wall of which are placed—opposite each tube end—covers or

inspection doors, of which two only are shown in Fig. 5. At the front end the junction boxes are also fitted with covers as shown. The curve of the tubes is such that, when the covers or doors at each end are removed, it is possible to see halfway down the tube from either end, so that the whole tube is open to inspection. It is worth noting that it is easier to establish the position of a flaw on the interior of a curved tube than it is to do so with a perfectly straight tube. The large number of made joints in this boiler is an undesirable feature.

The Highflyer—Minerva trials.

The Highflyer and Minerva trials, already mentioned, were of an extended nature. These two cruisers are identical in form and external dimensions, but there are differences between their machinery. The former ship has eighteen Belleville, and the latter eight cylindrical boilers. The Highflyer has four cylinder triple-expansion engines of 10,000 horse-power and the steam-pressure is 300 lbs. in the boilers, reduced to 250 lbs. at the engines. The Minerva's engines are three cylinder triple-expansion of 9,600 horse-power, the steam-pressure being 155 lbs. in the boilers and 150 lbs. at the engines. The weight of the Highflyer's main and auxiliary machinery is 373·8 tons, and of her boilers 461·5 tons. The weight of the Minerva's main and auxiliary machinery is 380·1 tons, and of her boilers 557·8 tons. The advantage on the side of lightness was therefore 102·6 tons in favour of the Highflyer.

The era of competition between the shell-boiler and water-tube boiler for navy work is past. We are never likely to go back to tank boilers for warships, and the practical question now to be answered is what type of water-tube boiler shall be adopted. The competition between the Highflyer and the Minerva is so instructive, however, that the trials will be noticed at some length, and later on two tables are given showing the observed results of evaporation tests. A circumstance that lessens the value of the trials, especially the early trials, for comparative purposes, although it strengthens the moral to be drawn from them, is that "the Highflyer," to quote the Admiralty report, "had been only recently commissioned for the first time, and, with few exceptions, the crew had had no previous experience with Belleville boilers."

Results of untrained crews.

The result was what might have been expected. To get good results, especially in regard to fuel consumption, with a Belleville boiler skilled stoking is undoubtedly needed, in order to keep the large grate area completely covered with a fire not too thick. On the first trials at the moderate speed of about 10 knots the Minerva's cylindrical boiler burnt 2·88 lbs. of coal per I.H.P. developed; whilst the corresponding figure for the Highflyer was 3·46 lbs. of coal. The

Coal consumption.

difference, of course, is very large and sufficient to counterbalance the gain in lightness on the side of the Highflyer. The matter is accounted for. Whilst the Minerva made her run without mishap, in the Highflyer there were, to quote the report, "two generator door

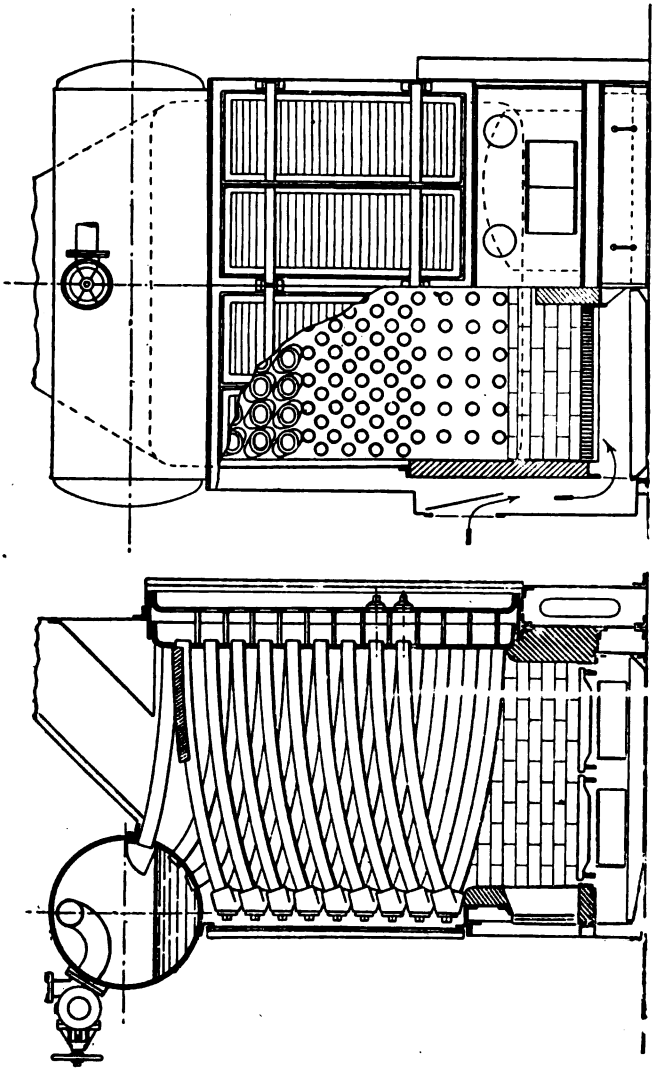


FIG. 5.

joints and seven economiser door joints leaky, and two fusible plugs were renewed."

These defects also made themselves manifest in the quantity of "make-up" water that had to be put into the boilers to replace that wasted. In the Minerva it was 5 tons for the 60 hours, but in the Lost water.

Highflyer it was no less than 42 tons. On two other trials of 60 hours each much the same results were recorded: boiler joints leaking, and both coal and make-up water largely in excess. Undoubtedly the Belleville boiler came out very badly on the three runs.

These results were so inferior to those recorded on the contractor's trials of the Highflyer that it was determined to have another run of 60 hours at low power. Previously to this being made, however, an inspector of machinery, experienced in the management of Belleville boilers, was sent on board, and the ship was sent to sea purposely for training the stokers. A marked improvement was the result. The coal consumption was brought down to 3·16 lbs. per I.H.P. per hour and the water consumption to 16 tons. Before the stokers had been trained the excess of coal burnt on the Highflyer over that of the Minerva was 16·5 per cent.; and this was reduced to 6·7 per cent. by the short period of instruction. At higher powers the coal consumption improved still further, the best figure for the Highflyer being at 9,132 I.H.P., when the fuel burnt was 2·36 lbs. per I.H.P. per hour; a result which indicates how wastefully the engines were working at the low powers, and also showing the misleading nature of trial data which include both engine and boiler performance. The Minerva's best record was 2·11 lbs. of coal per I.H.P. per hour.

Comparison, Highflyer and Minerva.

It will thus be seen that even at her best the Highflyer was beaten by the Minerva in regard to fuel consumption; and in the important matter of water wasted the advantage was enormously in favour of the tank-boilered ship. That is a point to which reference will be made later. At her best, however, the results of the Highflyer's trials were so much less satisfactory, in regard to coal consumption, than those obtained on the official contractor's trials, that the naval authorities concluded there was something wrong with the machinery, and on opening up at Devonport it was found that the low pressure valves and faces were much worn and not bearing satisfactorily, a circumstance that would account for considerable loss.

Speed.

In the matter of speed the Highflyer showed a distinct superiority, as she excelled the Minerva by nearly a knot (·94), comparing the best performances of both ships. In trials made to test the time taken in raising steam, the Belleville boiler naturally showed a very great superiority.

If it should be thought that the trials of the Highflyer and Minerva are here given more in detail than the instruction to be gained from them warrants, I would point out that so much has been said in the press and elsewhere about the preference shown to the Belleville boiler, that I have been, perhaps, over-anxious to put this chapter beyond such a reproach. In spite of the extra

speed of the Highflyer, her extra coal consumption on the early trials and the additional water consumed show the Belleville-boilered ship to disadvantage. For these reasons the results are given in detail. It can only be said that these trials are neither typical nor crucial. This view is borne out by subsequent performances, but more especially by water evaporation tests made later on with the Hermes and Diana.

The Hermes—Diana trials.

The Hermes—a second-class cruiser that later became notorious through her misfortunes—has Belleville boilers, her machinery being identical with that of the Highflyer. The Diana has cylindrical boilers. Both these ships were fitted with tanks for measuring the feed water, and trials were made. Unfortunately, the quantity of feed evaporated by the two descriptions of boilers respectively is not given in the reports, although the coal burnt per I.H.P. per hour and the weight of water used per I.H.P. per hour for all purposes are recorded. If the mean power developed be known, the water evaporated can be deduced. The figures as to horse-power are, however, so roundly stated in the case of the Hermes that some hesitation may be excusable in using them for the purpose; and again the auxiliary engines come in as a disturbing factor. The trials, on this more crucial test, are distinctly in favour of the Belleville boiler as the figures stand. "At the higher powers," to quote the official report of the trials, "the quantity of water passing through the engines, and the coal consumption, were both less in the Hermes than in the Diana; whereas, at the lower powers, although the coal consumption was still slightly less in the Hermes than in the Diana the water used by the former was more, showing that the boiler was more economical, but more steam was used in the engines."

The results of these trials are so instructive, outside their bearing on the question of cylindrical *v.* water-tube boilers, that the tables from the report are given in full on the two following pages.

Engine and boiler efficiencies.

There is a good deal in these tables worthy of note. For instance, when the Hermes was running at 2,000 I.H.P., about one-fifth of her full power, more coal was burnt in terms of the power developed than when she was fully pressed. If coal per I.H.P. were alone taken as a measure of efficiency of the boilers, as is so often done, it might be concluded that a higher boiler-efficiency was obtained on the high-speed run. This, however, is against common experience, for, within reason, the more easily a boiler is worked, the more economical it becomes; and therefore if different ships had run these two trials—say, ship A with shell boilers for the high-speed trial, and ship B with Belleville boilers for the low-speed trial—we should have been apt to say, "How much more economical

H.M.S. Diana.—Results of Water Consumption Trials.

Description of Trial.	Percentage of Full Power.	Steam Pressure.			Lbs. of Water per I.H.P. per Hour.			Lbs. of Coal per I.H.P. per Hour.	Remarks.
		Boilers.	Engines, Starboard.	Engines, Port.	Main Engines.	Auxiliary.	All Purposes.		
30 hours at 800 I.H.P.	8·3	101	96	97	20·59	5·68	26·27	2·82	
12 hours at 1,600 I.H.P.	16·6	124	120	121	18·94	4·21	23·15	2·52	Cut-off in horse-power cylinder 38 per cent.
30 hours at 1,600 I.H.P.	16·6	117	113	113	18·26	3·29	21·55	2·52	Cut-off in horse-power cylinder 44·5 per cent.
30 hours at 4,800 I.H.P.	50·0	133	128	128	17·09	2·14	19·23	2·02	
30 hours at 6,400 I.H.P.	66·6	138	129	129	17·9	2·56	20·46	2·38	
8 hours at 8,000 I.H.P.	83·3	150	144	144	17·75	1·94	19·69	2·39	

H.M.S. HERMES.—RESULTS OF WATER CONSUMPTION TRIALS.

Description of Trial.	Percentage of Full Power.	Steam Pressure.			Lbs. of Water per I.H.P. per Hour.			Lbs. of Coal per I.H.P. per Hour.	REMARKS.
		Boilers.	Engines, Starboard.	Engines, Port.	Main Engines.	Auxiliary.	All Purposes.		
12 hours at 1,000 I.H.P.	10·0	241	169	176	21·9	5·2	27·1	2·5	Main links linked up as far as practicable—cut-off in horse-power cylinder 13·5 per cent.
12 hours at 1,000 I.H.P.	10·0	163	124	123	20·1	6·67	26·8	2·3	Main links in full gear—independent links run in. Cut-off in horse-power cylinders 47·8 per cent.
30 hours at 2,000 I.H.P.	20·0	196	126	127	17·06	4·22	21·28	1·76	
30 hours at 7,500 I.H.P.	75·0	263	223	222	15·3	2·1	17·4	1·57	
12 hours at 7,500 I.H.P. (*Closed exhaust system in use.*)	75·0	264	228	219	—	—	16·84	1·5	Auxiliary exhaust at 26 lbs. pressure in use on evaporators and surplus to L.P. receivers.
8 hours at 9,000 I.H.P. (*Closed exhaust system in use.*)	90·0	270	249	244	—	—	17·13	1·54	Auxiliary exhaust at 29 lbs. pressure in use on L.P. receivers only.
8 hours at 10,000 I.H.P.	100·0	240	231	228	15·64	2·05	17·69	1·58	

the tank boiler is than the water-tube boiler, as it can beat the latter even when it is pressed." An examination of the engine records, which the measurement of feed-water enables us to make, shows that the comparatively poor economy at low speeds does not rest with the boiler, but with the engine. At the high-speed trial the main engines needed but 15·64 lbs. of water evaporated to develop one horse-power for an hour, but at the lower speed nearly $1\frac{1}{2}$ lbs. more were needed, and on one run at the lowest speed no less than $6\frac{1}{4}$ lbs. more.

Defects of low-power working.

At low-running speeds, with a high range of expansion of steam in the cylinders, excessive liquefaction takes place, with all its consequent evils; and there is also the higher ratio of power absorbed by friction. Very much the same conclusions may be reached by a comparison of the Diana experiments, although with them the difference is not so marked.

These figures, therefore, emphasize strongly the misconceptions that may arise through judging boiler performance from records of coal per I.H.P., a practice the undesirability of which has been more than once commented upon in the *Naval Annual*. At the same time, it is but fair to state, evaporative tests of boilers with measured feed-water may in themselves be misleading. In the first place they are very difficult to make, and need the greatest care in measurement and supervision. With every desire to be honest on the part of the staff, a little carelessness may upset the truth of the records. That, however, is common to nearly all machinery trials, but boiler tests are beset with a danger of their own. A boiler may prime or may supply steam so wet that a great deal of unevaporated water may be carried over with the steam. Such a boiler would be likely to show high evaporative efficiency, but it would be supplying steam that would effectually prevent the engine appearing to advantage, however good it might be if fairly treated. There are certain methods known to engineers by which the amount of unevaporated water mixed with steam is estimated; but it may be said that a good method for practical work has yet to be introduced.

Priming.

The engine as a calorimeter.

An engine, the performance of which is well known, forms in itself a very fair instrument for testing the quality of steam. For example, it may be that the steam used by a given engine is 15 lbs. per I.H.P. per hour when driven by a boiler at moderately low rates of combustion, while the measured water evaporated per hour per lb. of coal is 9 lbs. If now the fires be forced, and we find that the water evaporated rises to 11 lbs. per lb. of coal, whilst the engine needs 22 lbs. of steam, we may fairly suspect the boiler of adulterating its steam pretty heavily with hot water, supposing of course the steam is used at proper grades of expansion.

In examining the two tables of performances of these ships, the much higher steam pressure in the Belleville boilers will be noticed. It need hardly be said that theoretically the higher the steam pressure, the greater the economy, and no doubt the superior efficiency of the Hermes is largely to be attributed simply to increased pressure of steam. It is assumed, of course, that the Diana's boilers were clean and free, not only from scale, but any deposit due to grease. I believe the ship had recently returned from a commission abroad, but no doubt her boilers were well overhauled before the trials.

Leaky doors and joints.

But although high steam pressure is a most desirable thing for economy's sake, it has its drawbacks and dangers, due not only to excess of pressure, but also to its increased heat. If we consider its advantages, we ought also to refer to its disadvantages. During the trials of the Highflyer, we hear of generator door joints and economiser door joints leaking badly, and of joints in main steam pipes leaking. As the report very justly states, "higher pressures necessarily require greater perfection in all such parts as slide valves, piston-rings, and stuffing-boxes, as well as in all joints. The higher the pressure, the more steam will pass through any leak without doing useful work. The waste of steam from stuffing-boxes and joints is generally visible, but that which passes through any defective piston rings and slide valves, in either the main or auxiliary machinery, can generally only be discovered by taking the machinery to pieces." These passages are well worth bearing in mind by all who have charge of marine machinery, and, indeed, by all who are engaged in its manufacture also. In fact, higher pressures demand higher work, not only from the maker, but also from the operator. There must be a levelling up all round.

Loss of steam through stuffing-boxes.

In regard to the escape of steam from cylinders through stuffing-boxes, one engineer, at least, has essayed to meet the difficulty by greater accuracy of workmanship: Mr. Yarrow, the well-known torpedo-boat builder, having recently stated at a meeting of a technical institution that he proposed grinding piston rods smooth and truly cylindrical, in place of leaving them as turned by the lathe. This plan, I believe, has been followed out at the Poplar works, and possibly other makers of engines in this country have adopted the practice. A true fit of the cylinder rod in the packing is also a great advantage, as it tends to keep oil from being carried up into the cylinder, and from thence to the boiler, where its presence is sure to cause trouble. While speaking on this subject, I would like to call the attention of British engineers to the extended use abroad of the emery-wheel grinder. Both in the United States and Germany I have lately seen this machine-tool used with the greatest advantage in connection with a system of

special gauges, surface and fit being obtained at a cost that would not be possible to attain by the older systems. Of course emery-grinding has long been known in this country, but the practice appears to be more extensively adopted in the United States shops, and the Germans are fast following the Americans in this and other branches of engineering practice.

Condensers. A good deal of trouble has been caused in ships of the Royal Navy by leaky condensers, and here not only is fresh water lost, but salt water is liable to be introduced into the boiler. In some of the later ships the condensers are so arranged that one half can be shut off for examination and repairs whilst the other half is in operation. Condenser troubles generally arise, we are told by an Admiralty return, through the splitting of tubes; although pitting is also a fruitful source of trouble. Where condenser tubes are held between tube plates, it has been thought that vibration is largely accountable for splitting, but whether this be so or not, it would doubtless be safer if these delicate tubes were so arranged that the steam passed inside them and the refrigerating water outside. In that case the vacuum would be formed in the tubes, and they would thus be subjected to compression, so that incipient cracks, in place of opening, would be closed up. If surface condensers could also be arranged on the principle of the Niclausse boiler, practically as a series of Field tubes, so as to be free to expand and contract in place of being rigidly held between two tube plates, there would be less likelihood of leaky joints, and consequent contamination of the feed water by salt. Whilst speaking of the different effect of having pressure inside or on the outside of tubes, it may here be pointed out that in this respect the water-tube boiler is at a distinct disadvantage as compared to a fire-tube boiler, much trouble having arisen, not only through splitting, but also through lamination of tubes in water-tube boilers.

Pitting of condensers may be met by tinning. Mr. Yarrow, from whom we all gain so much instruction on these questions in the present day, has stated, during a discussion on the subject, that he has by actual experiment traced pitting to the action set up by different alloys in the metal of which the tubes are formed. The refrigerating water pumped through the condenser of course sets up a galvanic couple, which, intensified by the heat of the steam, leads to the well-known result. The defect is overcome by tinning the tubes, so long as the tin lasts. The period may be prolonged by the presence of zinc, but the remedy must be freely applied, and the slabs of zinc so distributed that no part of the condenser is beyond their influence.

That higher steam pressures lead to increased liability to leakage has been pointed out, but there is one advantage accruing from the same source which does much to counterbalance the defect. It will be noticed that in the full-power trial of the Hermes the steam pressure was reduced between the boiler and the engine by about 110 lbs. to the square inch. This is effected, as is usual in the Belleville system, by means of a reducing valve. Now it will be evident that in this case, if the full boiler pressure be maintained in the steam pipes, they can be made of smaller diameter than they would have to be if only the initial pressure in the engine were in them, and therefore they would be more flexible. With a water-tube boiler, more especially of course a small tube boiler, extra pressure is not a serious matter, so far as the strength of the boiler is concerned; and additional pressure can be reduced at the engine to that suitable for working. But, on the other hand again, the throttling of steam, or allowing it to expand without doing work, leads to superheating, and this in turn makes lubrication difficult, and the cutting of valves and valve faces or of cylinder walls more likely to occur. The scoring of valve faces has been already a serious source of trouble in engines supplied with steam by Belleville boilers, and it is worth considering whether throttling may not have been conducive to this end. Smaller steam pipes.

Taking all points into consideration, however, the most prevalent, and from one point of view the most serious, cause of leakage and loss of fresh water probably arises in those water-tube boilers that have large numbers of doors, hand-holes, and screwed joints. The danger is serious because it is insidious; leakage may go on from a defective boiler joint without being discovered. The steam that escapes is invisible, and is quickly absorbed by the hot and dry gases. An analysis of chimney gases will generally reveal the defect, but such analyses are not often made in practical work. With the vast number of joints that there are in many descriptions of water-tube boilers, very small leaks in a moderate proportion will account for a very serious loss of water. Whether the great excess of make-up water needed for the Hermes on her trials is to be accounted for in this way or not we have no information; but it is on record that she afterwards broke down at sea, was disabled for three days, and had to be towed to port, "the cause of failure being the great leakage of water combined with persistent failure of the feed pumps"; the latter probably the result of overwork. The boilers were seriously damaged, and a large number of tubes had to be replaced. Loss of feed water.

During the manœuvres of 1899 the Belleville boilers of the

Experience during the manœuvres.

Argonaut developed serious leaks from their doors, and from the joints in steam pipes; the Europa also suffered from a similar cause. A more recent mishap has been the giving way of a tube in the Belleville boilers of the sloop Mutine, unhappily attended by loss of life. The latter accident appears to have been due to failure of circulation, but as pieces of wood, and a steel bar 6 inches long and ½ inch in diameter, were found in the boiler after the accident, it would be unfair to attribute this mishap to defects in the design.

All these mishaps to the Belleville boiler have been seized upon by those who have made a business of opposing the introduction of the water-tube boiler into the Navy. These persons have taken little notice of the advantages offered by that type of steam generator, and they have been careful to forget the still more serious defects that were developed by the adoption of higher pressures in cylindrical boilers. For instance, during the manœuvres four Belleville boiler ships were included in those told off for the task of picking up the convoy, whilst a cylindrical boiler ship had to return, as she could not maintain the speed. A cylindrical boiler ship had also to go back to port, being short of water. It is stated that 20 battle-ships, 22 armoured cruisers, 10 protected first-class cruisers, and 9 second-class cruisers, or 61 ships in all, now fitted with Belleville boilers, would have had each a knot less speed had return-tube boilers been used. Such facts as these are all conveniently forgotten when an attack has to be made on Admiralty engineers, who, it must be remembered, are debarred by official regulations from making any reply, however much they may be vilified, and however strong a case they may have.

Wastefulness of over large engines.

The tables on pp. 132 and 133, giving the results of the evaporative trials of the Diana and the Hermes, afford some useful illustrations of the working of high pressure steam as used in the engines. Reference having been so often made to the advantages of high pressure steam, it is right that an instance on the other side should be given. It will be noticed that the first two runs of the Hermes were made at the same power, but the results as to economy came out very differently. In the first run the boiler pressure was 78 lbs. higher than during the second trial, whilst in the engines also it was about 45 to 50 lbs. higher in the first trial. With the higher pressure of steam on the first trial, however, the coal consumption was one-fifth of a pound per I.H.P. per hour higher than on the run when the pressure was lower. Naturally, in order to get a like terminal pressure in the engines, the higher pressure steam would have to be worked at a greater number of expansions, and that it was so worked is shown by the fact referred to in the "Remarks" column, that on the first

trial steam was cut off in the high pressure cylinder so early as 13·5 of the stroke. In the second trial, the lower pressure steam was admitted to not far from half stroke, and naturally worked less expansively. The result of working with too much expansion and too little steam in a big engine is well shown in the column giving pounds of water per I.H.P. per hour. The results would have been far more favourable had the engines been a tenth of their actual size. It will be seen also in the Minerva's trials that with equal power developed, as on the second and third runs, the economy of the engines was improved by lengthening the period of steam admission and reducing the expansions; although here the difference was not great, the cut-off being 38 and 44½ per cent. of the stroke for the two trials respectively. The boilers did better, apparently, on the first of the two runs, as the coal per I.H.P. comes out the same in each case.

It will be seen from the details here given how difficult it is to design a warship to give satisfactory economy. The average merchant vessel has boilers and engines proportioned for giving the best results at the one speed she always runs at. Her engines need not be too big, and her boilers may be big enough. The fighting ship must have very big engines for high fighting speed, and these are wasteful at lower or ordinary speeds. But to give this fighting speed the boilers must be light, that is small, and they are wasteful at high speeds. In other words, when the engines are doing well the boilers are not, and *vice versâ.*

Efficiency of heating surface.

Whilst dealing with the use of high pressure steam, there is another point to which reference may be made. The heat of saturated steam necessarily increases with the pressure, and the sensible heat of the water in contact with the steam also increases. The readiness with which heat is taken up by water, in a given boiler, depends on the extent to which the furnace and the furnace gases exceed the water in temperature. In other words, heating surface in a low pressure boiler should be more effective than if the steam were at higher tension. Naturally this would make the chimney gases colder, and therefore less heat would be thrown away in the funnel. The greater advances in coal economy effected during the last thirty years or so have been made in the engine and not in the boiler. There is, however, another reason why modern cylindrical boilers are not as economical as the old rectangular flue boilers, for the latter afforded more space for combustion. The big-tube boilers of the water-tube type have not taken advantage of the opportunity for improvement offered them in this respect. In the Belleville boiler, as explained in a previous issue of the *Naval Annual,* an effort has

been made to get over this defect by air jets above the fire, but the device has not been altogether successful to judge by the reports one hears as to "black smoke." The design of small-tube boilers is more satisfactory in this respect.

Exhaust steam of auxiliaries.

There is one more point to which attention may be drawn before leaving the Hermes trials. The question of auxiliary machinery was discussed at some length in last year's *Naval Annual*. In the tables on pp. 132 and 133 it will be seen that the trials at 7,500 horse-power and at 9,000 horse-power were those at which the best economy was obtained, not only in fuel burnt, but also in water consumed by the engines. On these two runs it will be further noticed that the exhaust steam from the auxiliary engines was carried to the evaporators or to the low pressure stage of the main engines. On the other trials it may be presumed the auxiliary exhaust was taken to the auxiliary condensers direct—a deplorable thing to do with steam at 26 lbs. and 29 lbs. pressure. There is, it will be seen, a distinction between these two trials. On the first, 7,500 horse-power, the evaporator received part of the steam, the surplus only being taken to the main engine. This gives the best result. The water used is over ½ lb. less (0·56) per I.H.P. per hour than on the previous trial at the same power and approximately the same pressure. There are drawbacks, on a war-ship—where it is desirable everything should be independent—in passing auxiliary exhaust steam to main engines, and for this reason one notes with satisfaction that the evaporators appear to be the better vehicles for using up this otherwise waste heat. The figures in the table bring this out very clearly.

Mechanical stoking.

The possibility of feeding the furnaces of marine boilers mechanically is a thing that is being constantly suggested, and a good deal of surprise that such a scheme has not been carried out is sometimes expressed by those who are not marine engineers. There is no doubt that a practical power-driven device that would take the place of the stoker's shovel would be a great blessing on board ship, and therefore any serious efforts in this direction are worth attention. Some time ago an enterprising firm of marine engineers in the North made experiments in this direction, but, so far apparently, not with any prominent success. The difficulties are considerable in marine boilers, far more so than in the case of land boilers. One of the chief is the lack of space. In the first place, for a mechanical or automatic stoker to be worked to full advantage the coal must descend to the first receptacle or hopper in front of the furnace by gravity. It needs a very slight knowledge of the bunker arrangements on board ship to see how serious an obstacle to success this is. The movement of the ship adds a disturbing feature, and the limited height of furnaces is

Difficulties in using afloat.

also a drawback. Moreover a good deal of the success of mechanical stokers on land is due to the fact that they enable a common description of smoky coal to be burnt with advantage; whilst at sea, with good Welsh coal, the less the fire is disturbed the better. It is not easy to find space in the boiler room for the mechanism of an automatic stoker, but this difficulty could be overcome if the bunker arrangements could be brought into line.

Advantages of automatic firing.

On the other side of the account, an automatic stoker that would proceed mechanically with its work during periods of great excitement, that would cover a fire grate evenly to an adjusted depth under given circumstances, that would do away with the frequent opening of the furnace doors, and that would relieve a ship's crew of about the most arduous and trying work civilised men have to perform; such an apparatus would indeed be a blessing to humanity. The even covering of the grate would permit of nice adjustment of air supply, because the feed of coal being constant and regular, the air needed for combustion would be the same at all times.

Coking and shovel stokers.

There are several descriptions of mechanical stoker. In one of them small coal falls on to a shovel, or sprinkler, in the mouth of the furnace. By means of springs and suitable mechanism the fuel is jerked over the fire in small quantities at regular and frequent intervals, with a view to keeping the grate evenly covered. Another invention consists of an automatic ram, which has imparted to it a horizontal reciprocating motion. The coal falls from the hopper on to a dead plate in the mouth of the furnace, and the ram entering the heap, gradually pushes the fuel forward after it has been coked on the dead plate. Another class comprises what are known as underfed stokers, and one of these has been tried afloat in America on a large scale, as the following facts will show.

American automatic stoker.

The Minnesota Steamship Company own a vessel trading on the big American lakes, which has a displacement of over ten thousand tons, so it will be seen she is a ship comparable to our large ocean-going vessels in size. She is not very high-powered, however, her engines working up to about 1,600 horse-power. Steam is supplied by two Babcock and Wilcox boilers, a type in extensive use in American lake steamers. The steam generating tubes are 2 in. in diameter, and each grate is 65 sq. ft. in area. To each boiler there are fitted three of the American Stoker Company's mechanical stokers, which are of the underfed type.* The arrangement consists of a hopper placed at the boiler front in the position where the furnace

* This type of automatic stoker is to be applied to a large steamship with water-tube boilers, now being built in England, by the Underfeed Stoker Company, of 31, Walbrook, E.C.

door would ordinarily be. The bottom of the hopper opens into an almost horizontal tube, which extends beyond to beneath the grate in the form of an open-topped trough. Inside the middle of the tube and trough, running through their entire length, is a conveyer, consisting of a shaft, round which is a worm of flat spiral. This is revolved by a small independent engine securely boxed in and placed at the outer end of the shaft.

The action is as follows: The coal falls from the hopper by gravity on to the worm, and as the latter revolves it feeds the fuel forward through the tube and then into the trough beneath the grate. The top of the trough being open, the coal rises through the slotted opening and overflows on to the grate. The sides of the trough bordering the slotted opening are wide enough to form a double dead plate—one half on each side of the opening—and here the coked coal is first deposited as it overflows in the furnace. By means of a blower air is forced beneath the dead plate and passes out amongst the fuel by openings at the side. This enables combustion to take place. No air enters from the ash pit in the usual way. The slotted opening and its marginal dead plate do not occupy the whole width of the grate, there being grate bars at the side and parallel with the opening. The coal, as it passes up from the trough, is coked by the heat of the fire above; the gases, being driven off gradually and continuously, permeate the glowing coke mass, there mixing with the air and being consumed; or if any ascend into the space above the fire, they are still subject to the radiant heat of the furnace, so that they will be burnt, supposing, of course, sufficient air to be present. The expansion of the gases among the coke during combustion keeps the mass of fuel moving, and materially assists the working of the furnace. In this way, if the apparatus works as it is intended to do, there is no smoke, and the other advantages incidental to mechanical stoking are secured. Naturally the zone of combustion cannot descend through the slotted opening into the mass of fuel in the trough beneath the grate, because air is not admitted to the trough.

Fires are cleaned by slicing between the bars and raking out clinker in the usual way, there being a furnace door on each side of the hopper. Firing by hand can be carried on through these doors should the apparatus break down. In the Pennsylvania the exhaust steam from the engines that work the stoker is admitted to the ash-pit. Such an arrangement is quite permissible in a vessel running on the fresh-water lakes—indeed the main engines have jet condensers—but would be a serious matter in a sea-going ship. The steam used in working the stoker and driving the fans is said to be 1½ per cent. of that generated for all purposes.

An extensive series of trials was made with the Pennsylvania by Lieutenants B. C. Bryan and W. W. White, U.S.N., by direction of the American Bureau of Steam Engineering. The records of these experiments are given in the *Journal of the American Society of Naval Engineers*, Vol. xi., No. 3. The weight of each stoker complete as fitted in the Pennsylvania was found to be 3,500 lbs. There was one Sturtevant blower, 60 inches in diameter. The coal was of an inferior grade, giving on test 11,790 B.T.U. per lb. dry. The cost of operating all stokers and blowers was found to be 1·68 per cent. of the steam made, allowance being made for the blower exhaust passing through the feed heater. The stokers worked satisfactorily throughout, and "the steam required at all times was generated without difficulty, and, no doubt, with greater ease and economy than if hand firing had been employed. Only an extremely light smoke was observable during the ordinary working of the stokers. Practically, it may be said the coal was burned smokelessly, except when the cleaning doors were opened." A successful trial was subsequently made, coaling being carried on through the cleaning doors, "demonstrating the feasibility of feeding the furnaces by hand." It is stated in another report that "one fireman can readily handle four stokers, shovelling his own coal. With mechanical coal carriers along the front of the boilers, one man can handle from twelve to fifteen stokers." Probably this does not refer to marine practice. Trials of Pennsylvania.

In a former issue of the *Naval Annual* reference was made to the Inchmona, a merchant steamer fitted with four-stage compound engines having five cranks. These engines were designed by the late Mr. Mudd and built at the Central Marine Engine Works, West Hartlepool. It will be remembered that by means of various devices the fuel consumption was reduced to a very low point, about 1 lb. of coal being sufficient to supply steam to give 1 I.H.P. for an hour. It was questioned at the time by some whether the additional complication and expense involved was warranted by the saving in fuel; but that question is answered by the owners, Messrs. Hamilton, Fraser & Co. of Liverpool, having three more ships built with machinery by the same makers of a like description, although certain improvements of an important nature have been made by Mr. Borrowman, who has succeeded the late Mr. Mudd. According to data observed on a run made by one of these ships, the Inchmarlo, from Hartlepool to Dover, the coal consumption has been now brought down to the remarkable figure of 0·97 lbs. of coal per I.H.P. per hour. The cylinders are, high pressure 17 inches, first intermediate pressure 24 inches, second intermediate pressure 34 inches, and two low pressure of 42 inches, the stroke being 42 inches. They are of The Inchmarlo.

1,600 horse-power. The boilers are of the cylindrical return-tube type and work at no less than 267 lbs. to the square inch. As they are 13 feet in diameter, it will be understood that the shell must needs be of rather massive scantling, and the plates are $1\frac{19}{32}$ inch thick, whilst the staying is unusually strong. Serve tubes are fitted, with internal longitudinal ribs to collect the heat of the gases more effectually.

Heat-catching devices.

In order to reduce loss by escape of heat, every precaution has been taken. Except the high-pressure cylinder, all cylinders are completely steam-jacketed, including the tops and bottoms, and the asbestos lagging is of a very complete nature. Superheaters are so arranged that the steam on its way from the boilers to the engine passes through a series of pipes, which are placed in the uptake through which the heated gases are carried to the base of the chimney. The feed water is also heated before entering the boiler. After leaving the hot well it is filtered, and then brought into contact with a Weir's feed heater, where its temperature is raised from about 96 to 209 degrees. It is then taken to a surface-heater and is brought up to about 370 degrees. The temperature of the water in the boiler is about 412 degrees. The steam, which leaves the boiler at 412 degrees, is heated to about 470 degrees in the superheater, but about 23 degrees of this superheat are lost on the way to the engine, so that the steam enters the high pressure steam chest at a superheat of about 35 degrees. This was found to be due to inefficient lagging of steam pipe, and was entirely obviated in later steamers. The result is well shown in the indicator diagrams, the combined area of which—in spite of some wire-drawing due to the superheater—is about 88 per cent. of the calculated area of a combined diagram. Induced draught on the Ellis and Eaves system is used, and the air supplied to the furnace is heated in the following manner. The furnace gases, before passing to the fan—which is at the base of the funnel—and after leaving the superheater, are drawn through a series of tubes contained in a casing. The air to support combustion passes among these tubes on its way to the ashpits, and its temperature can thus be raised from 53 to 299 degrees. The furnace gases leave the tubes of the boiler at about 587 degrees; they part with 44 degrees in superheating the steam, and with another 39 degrees in heating up the air for combustion. They therefore enter the fan at 404 degrees, a temperature actually below the heat of the steam and water in the boiler.

Reasons for economy.

The design of the machinery in these vessels indicates the manner in which the economy of higher steam pressures, made possible by modern boiler practice, may be secured. The uselessness of over-

expansion has been already shown by the low-power trials of the Hermes, but high ratios of expansion are needed to secure the economy of high pressure, and therefore expansion through four stages has been adopted. This, of course, reduces the condensation in the cylinders as compared to the triple-expansion engine—for the same reason that the ordinary two-stage compound was an improvement on the simple engine, with expansion in one cylinder; but in order to still further prevent liquefaction of steam in the cylinders, the designers of these engines have not only applied a very complete system of steam jacketting, but also superheat their already very hot steam. These are heat-saving devices which prevent the temperature imparted to the steam in the boiler being carried through to the condenser without doing work. The heat from the jacket steam has to be paid for at first hand, but doubtless it is worth its cost, for nothing is worse than water in a cylinder, as Willans proved some years ago by a very pretty experiment. The superheating however, is obtained from the temperature of the waste gases, from heat that would otherwise go up the funnel; and the same may be said of the heating of the air for combustion.

With high pressure steam, necessarily high temperature also, it is more needful to work on this regenerative system. As already stated, the ratio of temperature between the furnace, or furnace gases, and the water in the boiler is a measure of the efficiency of any given area of heating surface of a boiler. As pressures increase, a nearer equality of temperature on the two sides of the boiler heating surface is reached; for, though it is quite possible to raise the heat of the fire by forced draught, or by heated air, as in the present case the degree to which this can be done is limited. Under these circumstances, the higher the pressure at which steam is generated, the higher is likely to be the temperature at which the products of combustion escape from the boiler, and unless means are taken to catch some of this waste heat, it passes uselessly up the funnel. A regenerative system.

These, of course, are elementary considerations well known to engineers, but they are worth repeating here, because in the machinery of these merchant vessels they have been applied in a manner that appears to be remarkably successful, to judge by reports from well accredited authorities. The working out of the various devices to a fortunate issue has involved much labour, expense and experiment, and both the constructors and owners deserve credit for the result. It has been calculated that in this ship one ton of cargo is carried one nautical mile on an expenditure of one-third of an ounce of coal, and allowing coal to be 15s. per ton, one pennyworth would carry one ton of cargo 550 miles. The designer of warship machinery The cost of transportation.

can hardly hope to reach such figures as these, at any rate on existing lines, because a cargo vessel, such as the Inchmarlo, is designed throughout to the end that she may carry the greatest weight over a given distance with the smallest expenditure of fuel; a feature which is quite secondary in a war vessel. Nevertheless the Inchmarlo is a useful example to naval engineers.

The steam turbine.

The steam turbine of Mr. Parsons continues to attract attention in marine engineering circles, but there is not much that is new calling for notice here. Since last June the Viper has only made two trials at Portsmouth, and has reached a speed of 33·8 knots with regulation weights, and limited to 3 in. of air pressure. With 5 in. she steamed 3 knots faster—namely, 36·8 knots. The fact shows how important a point the boiler plays in the design of these high-speed craft. She has been passed and goes into commission in about six weeks from the time of writing. The Cobra, the other destroyer with Parsons engines, has not been run since May of last year, and is now being altered to meet Admiralty requirements. She will be delivered at Portsmouth some time in May. It is intended that both these destroyers shall take part in the autumn manœuvres this year, so that there will doubtless be a good opportunity of learning how machinery of this class will act under the conditions of actual service.

In regard to the use of the steam turbine in mercantile vessels, there will, during the coming year, also be an opportunity of gaining practical experience. Messrs. W. Denny & Bros., of Dumbarton, have now in course of construction a passenger steamer which is intended for the Fairlie and Campbeltown route in connection with the Glasgow and South Western Railway Company. She is expected to start running about the 1st of July, and will doubtless prove one of the attractions of the Exhibition year. The vessel will be 250 ft. long by 30 ft. wide, and 6 ft. 6 in. draught. The engines will exert 3,500 I.H.P., and the speed will be from 20 to 21 knots. She will have a No. 2 modified Board of Trade certificate. There will be one large double-ended return-tube boiler. The shafts will be three in number, one screw being on the centre shaft and two on each of the side shafts. The performance of this vessel will be watched with the greatest interest.

The Boiler Committee's Interim Report.

Since the foregoing was written, the Interim Report of the Admiralty Boiler Committee, to which reference is made in the opening paragraph of this chapter, has appeared. The document is one of considerable importance, and has led to a good deal of discussion in the Press. It has been criticised chiefly on the score that the *personnel* of the Committee was not of a nature which

enabled a true estimate being formed of the value of the Belleville boiler, and because the members, with one exception, had not had experience in the working of water-tube boilers. In regard to this objection, it may be pointed out that the members of the Committee are all trained engineers of eminence in their profession. Their names are as follows: Mr. J. A. Smith, R.N., Inspector of Machinery; Mr. John List, R.N.R., who is the Superintending Engineer of the Castle Line; Mr. James Bain, R.N.R., Superintending Engineer of the Cunard Line; Mr. J. T. Milton, Chief Engineer-Surveyor of Lloyd's Register of Shipping; Dr. A. B. W. Kennedy, who was for many years Professor of Engineering at University College, London; Dr. J. Inglis, who was the chief partner in the firm of Messrs. A. and J. Inglis, the well-known firm of engineers and shipbuilders of Glasgow. The president of the Committee is Vice-Admiral Sir Compton Domvile, K.C.B., and the secretaries are Commander Montague E. Browning, R.N., and Chief Engineer William H. Wood, R.N.

Mr. Smith's reservations.

The Committee are unanimous in the Report, with the exception of Mr. J. A. Smith, who may be said to have represented the Naval element. This gentlemen, however, agrees with the tenor of the Report as a whole, but explains that, in his opinion, the Belleville boiler will give satisfactory results when carefully treated, and he thinks there is no necessity for delaying the progress of ships already designed for them. A good deal has been said about Mr. Smith not subscribing to the Report of his colleagues, but it will be seen from the words he quoted that he does not express any opinion very strongly opposed to their ruling. It may be that a boiler will act admirably under favourable circumstances, as no doubt the Belleville boiler has done and will in future do. In practical work, however, both in the Navy and in the mercantile marine, favourable conditions are not always secured, and a steam generator is needed that will not only "give satisfactory results when carefully treated," but can also be depended upon not to be permanently injured or break down when the treatment is perhaps less careful than might be desired. Turning to the main body of the Interim Report, we find the Committee first stating that they are "of opinion that the advantages of water-tube boilers for naval purposes are so great, chiefly from the military point of view, that, provided a satisfactory type of water-tube boiler be adopted, it will be more suitable for use in His Majesty's Navy than the cylindrical type of boiler." This expression of opinion, coming from a body of engineers so eminently qualified to speak, should be sufficient answer to those critics who desire a return to the cylindrical boiler. It is hardly necessary to repeat here that

the water-tube boiler (not necessarily the Belleville boiler) has been adopted in all navies of the world, and, should it be determined by the Admiralty to return to the shell boiler, the British Navy would be placed in a position of distinct inferiority in regard to the speed of its ships.

Recommendations in regard to Belleville boilers.

The Committee next state that they do not consider that "the Belleville boiler has any such advantage over other types of water-tube boilers as to lead them to recommend them as the best adapted to the requirements of His Majesty's Navy." The statement as it stands is somewhat colourless, and must be taken in connection with the recommendations that follow it. They are as follows :—

(*a*) As regards ships which are to be ordered in the future; That Belleville boilers be not fitted in any case.

(*b*) As regards ships recently ordered, for which the work done on the boilers is not too far advanced: That Belleville boilers be not fitted.

(*c*) As regards ships under construction, for which the work is so far advanced that any alteration of type of boiler would delay the completion of the ships: That Belleville boilers be retained.

(*d*) As regards completed ships: That Belleville boilers be retained as fitted.

These recommendations cannot be taken as otherwise than a condemnation of the Belleville boiler, though not of so sweeping a nature as to lead to it being replaced where it has once been put in position. Were the latter course proposed, it would be indeed almost impossible to carry out, as the engineers engaged on the Committee must have recognised. One of the great advantages of the water-tube boilers consists in the possibility of fitting it in a ship in small parts, so that the decks need not be disturbed and the general structural arrangement of the ship disorganised. Indeed, to re-boiler the whole fleet of vessels that have been fitted with the Belleville boiler—as some who claim to speak with authority have advocated—would be to reduce Great Britain for a time to the position of a second or third-rate naval power. As a matter of fact, the Belleville boiler is a great advance upon the naval type of cylindrical boiler which it replaced; and, though its merits are not so great as those of other types of water-tube boilers, largely owing to defective circulation, yet it can and has performed excellently for long periods of time under favourable circumstances.

The Committee have had under consideration four types of large

straight-tube boilers which have been tried in war vessels and are now being adopted on an extended scale in foreign navies. These are as follows: the Babcock and Wilcox boiler, the Niclausse boiler, the Dürr boiler, the Yarrow large-tube boiler. The two former have been fitted in vessels of the Royal Navy for experimental purposes with satisfactory results. The Dürr boiler is not well known in England, but was described some years ago in a paper read by Mr. Milton before the Institution of Naval Architects. I have never seen it in work, but gather that it is somewhat similar in principle to the Niclausse boiler, though doubtless there are differences in detail. There are internal tubes for circulation, the arrangement apparently being that of a number of Field tubes placed horizontally or approximately so; perhaps the worst position in which Field tubes could be placed. In these boilers, however, some head for circulation is afforded by the division of the water-chamber. The Yarrow boiler of the Express type, as fitted in torpedo craft, is well known in this country, and has been frequently referred to in former numbers of the *Naval Annual*. It was also illustrated in the issues of 1896 and 1898. The Babcock and Wilcox boiler and the Niclausse boiler are referred to on a previous page. What is described in the Report as the large-tube type of Yarrow boiler has been placed in a number of armour-clad vessels and large cruisers in foreign navies, as already stated in this chapter. It is essentially of the same design as the ordinary Yarrow boiler, but the tubes are somewhat larger in diameter and the metal in them is thicker. There is, however, one point in connection with this subject which was not previously mentioned, but of which advantage may be taken to point out here. In the Yarrow system a certain size boiler tube may be determined upon, dependent upon the need of any navy, and that size should be adopted throughout all war-vessels in that navy. The tubes being in every case straight, interchangeability of tubes is ensured. In time of war, when speedy repair becomes absolutely necessary, this point is of vital importance. The comparison has already been made between the Yarrow boiler and the Belleville boiler in the *Naval Annual*, and it is hardly necessary to go over the whole ground again. The great advantage the Yarrow boiler possesses is that its tubes are but slightly inclined from the vertical, as compared to the Belleville boiler, in which the tubes are almost horizontal. The communication between the water vessels and the steam separator is much shorter and more direct in the Yarrow boiler. The result of these features is that the circulation in the latter type of steam generator is far more vigorous, and it can therefore be operated with safety under forced draft, but it will perform equally well under the more ordinary conditions of

Other boilers to be tried.

steaming. The fact that all the tubes are expanded in place of being screwed, and that there is not a multitude of small doors and hand-holes, is also a point very much in favour of the boilers of this type. As already stated, the loss of water on some of the trials of the Belleville boiler was exceedingly great, and this has been attributed to small leakages at innumerable joints.

It has already been said that the Babcock and Wilcox and Niclausse boilers are being fitted into Government vessels, and the Committee recommend that the work on these should be hurried on, so that they may make practical trial of the boilers mentioned. They also recommend that boilers of the Dürr and of the modified Yarrow type should be made and tested at the earliest possible date. These recommendations have been adopted, and the work has been commenced since the Report was issued. The following are what the Committee consider the practical and serious objections in the design of the Belleville boiler:—

Defects of the Belleville boiler.

(*a*) The circulation of water is defective and uncertain, because of the resistance offered by the great length of tube between the feed and steam collectors, the friction of the junction boxes, and the small holes in the nipples between the feed-collector and the generator-tubes which also are liable to be obstructed, and may thus become a source of danger.

(*b*) The necessity of an automatic feeding apparatus of a delicate and complicated kind.

(*c*) The great excess of the pressure required in the feed-pipes and pumps over the boiler pressure.

(*d*) The considerable necessary excess of boiler pressure over the working pressure at the engines.

(*e*) The water-gauges not indicating with certainty the amount of water in the boiler. This has led to serious accidents.

(*f*) The quantity of water which the boiler contains at different rates of combustion varying, although the same level may be shown on the water-gauges.

(*g*) The necessity of providing separators with automatic blow-out valves on the main steam-pipes to provide for water thrown out of the boilers when speed is suddenly increased.

(*h*) The constant trouble and loss of water resulting from the nickel sleeve-joints connecting the elements to the feed collectors.

(*i*) The liability of the upper generator to fail by pitting or corrosion, and, in economiser boilers, the still greater liability of the economiser-tubes to fail from the same cause.

(*k*) The upkeep of the Belleville boiler has so far proved to be more costly than that of cylindrical boilers; in the opinion of the Committee this excess is likely to increase materially with the age of the boilers.

(*l*) The additional evaporating plant required with Belleville boilers, and their greater coal consumption on ordinary service, as compared with cylindrical boilers, has hitherto nullified to a great extent the saving of weight effected by their adoption, and, in considering the radius of action, it is doubtful whether any real advantage has been gained. The Committee are not prepared, without further experience, to say to what extent this may not apply to other types of water-tube boilers.

The Report further states that at the time the Belleville boiler was introduced into the Navy, in the Powerful and Terrible, it was the only large-tube type of water-tube boiler that had been tried at sea on a considerable scale under ordinary working conditions. The Committee, therefore, consider that there was justification for then regarding it as the most suitable type of water-tube boiler for the Navy.

In speaking of the addition of the economiser, it is stated that, "in view of the rapid deterioration of economiser-tubes in several vessels, the Committee have specially considered whether the extra power per ton of boiler at high rates of combustion, obtained by the use of economisers, has not been too dearly purchased. The evidence before them indicates that at the lower and more usual rates of combustion, the Powerful type of boiler has given results as satisfactory as the economiser type. It is at the same time less complex and free from the special risks of tube deterioration, which have proved so serious in many cases, notably in the Europa. They therefore recommend, for ships under construction, that the non-economiser type should be reverted to where practicable, with the tubes raised higher above the firebars to increase the combustion space, and that where possible the steam collectors should be made larger and more accessible internally." Economisers.

It is recommended, however, that cylindrical boilers should be maintained for distilling and other auxillary purposes in harbour as well as at sea. The shell type of boiler is considered more suitable

and economical than any type of water-tube boiler. The statement is somewhat comprehensive, and one would like to know whether it is to be taken as applying universally. At any rate, the Report advises that all new vessels of large power should be provided with cylindrical boilers to do the auxiliary work.

The public will look forward with interest to the publication of the full Report, which, however, will doubtless not appear for some considerable time. It is proposed to carry out further trials of somewhat extended nature, including a run of the Hyacinth and the Minerva, fitted respectively with Belleville and shell boilers, from Portsmouth to Gibraltar and back.

G. R. Dunell.

CHAPTER VII.

The Manning of the Navy and Mercantile Marine.

The manning of the Navy and mercantile marine is a subject, as all admit, of national importance. Under the changed conditions of this age of steam, new and grave difficulties have arisen in furnishing an adequate supply of seamen. The best seamen of the present day are worthy successors to those of the elder generation. We see with regret the rapid reduction in their numbers. Fifty years ago we had 200,000 British seamen in our mercantile marine ; we have scarcely half that number at the present time. Our British A.B.'s and firemen in the over-sea trade will soon be outnumbered by foreigners and Lascars. For the trade through the Suez Canal to India and the Far East the men of the tropics are better adapted than those of our Northern race. British seamen and firemen must suffer—it is almost inevitable that they should deteriorate – if serving continually under the rays of a vertical sun. In other branches of trade it would be well if our ships were manned more fully than at present by British subjects. The falling off in numbers is the more deplorable, because it is mainly amongst the younger men. The state of things is grave, and calls for the attention of statesmen.

Our inadequate national supply of seamen.

We may dismiss from view the difficulties with which the shipowners have to deal. The efficient manning of their ships is a question of wages. It is not the business of the State to favour any industry, however important, by supplying labour partially paid from the public exchequer.

Viewed from another standpoint, that of those employed in the mercantile marine, the state of things leaves much to be desired. It will be admitted that those who follow the sea are insufficiently compensated in pay for the social privations of a calling in which the bread-winner must leave his home to earn his livelihood. Wages, however, cannot be fixed by legislative enactment. Whether under free trade or protection, remuneration depends on large economic causes which lie beyond the control of the Legislature. The shipowner complains of that competition, both under the British and the

foreign flag, which often makes his hazardous business barely remunerative. Seamen are exposed to the same competition in its acutest form. The report of the Manning Committee of 1896 is very emphatic on this point. The whole world has been open as a recruiting ground to British shipowners; they have not been hampered in their selection by any restriction as to colour, language, qualification, age or strength. It is idle to propose a return to the old Navigation Laws; our shipping industry, in common with other industries, has greatly prospered under free-trade; the country will not lightly reverse a system under which great interests have been created.

The increase of the permanent naval *personnel*.

There is, however, another aspect of the question before us. It has been and will continue the policy of the State to maintain such a Navy as will command the seas. In pursuance of that policy, shipbuilding for the Navy has been increased in vast proportions. For the manning of the ships which we are rapidly adding to the fleet, the Admiralty has relied mainly upon the permanent force. In round figures it has been doubled since I first entered Parliament. If the increase continues in the same *ratio* during the next decade a heavy burden will be imposed upon the taxpayer. The ports will be crowded with men for whom it will be difficult to provide sufficient training at sea. Never before in history has it been attempted by any maritime power to maintain in peace the full numbers required to man the Navy in time of war. Reliance has been placed on a force in reserve, of which the French "Inscription Maritime" is the earliest, as it is still the most perfect, example. The French maintain a reserve capable of supplying 40,000 efficient men to the Navy, and that from a mercantile marine, the tonnage of which, in comparison with our own, stands in the relation of one to ten. It seems no exaggeration to say that we require at least 50,000 men in our Naval Reserves. A deficiency in engine-room complements could rapidly be made up from the mercantile marine. To train seamen is more difficult. The fostering care of the State is needed. It is my object to urge that a great national duty should no longer be neglected.

War strength maintained in peace time.

Reserves should be strengthened.

Officers of the mercantile marine.

Dealing first with the officers of the mercantile marine, the aid of the State can be justified in so far only as it may be necessary to provide for the manning of the Navy. In comparison with continental countries, little has been done by the British Government for nautical education. The Naval University at Greenwich is open to merchant officers; an efficient college has been established at Liverpool by the municipal authorities. Few have been found to avail themselves even of these limited opportunities. The reason is

obvious. There was no prospect of reward for labour bestowed on mathematical studies.

Training.

While the State has done little, private enterprise has come in to supply what was wanted. An excellent combination of theoretical and practical training for officers is afforded to the cadets of the merchant service on board those well-known school-ships, the Worcester and the Conway. While the professional education has been admirably begun in these school-ships, no adequate provision has yet been made for professional training at sea. Here again the aid of the State can only be justified in view of the necessity for an efficient reserve of officers. That some assistance should be given in providing facilities for the sea training of officers for the Reserve is a proposition, as I venture to think, not open to question. Under present conditions it is not reasonable to look to the merchant navy to supply a large reserve of officers having the comprehensive professional attainments which we find in the Royal Navy, as the result of a long and elaborate course of training. To bring a reserve fully up to the level of a permanent force is neither necessary nor feasible. Much may, however, be done to extend the very limited opportunities of training for officers at present available.

Private efforts.

Here I may perhaps permit myself to refer to an unaided effort to remedy the present unsatisfactory state of things. To meet the wishes of parents and guardians anxious to send their boys to sea, I purchased two sailing ships, the Hesperus and the Harbinger. In each twenty-four midshipmen were carried. An experienced officer of the Royal Navy conducted the school work, embracing all branches of a practical nautical education. As a scheme for the training of young officers at sea the experiment was highly successful. Our lists were always full. The cadets were of the right stamp and quality, full of ardour for a nautical career. They had the distinguished bearing and attractive manners which we admire so much in the gun-rooms of the Royal Navy. Unfortunately the vessels were of an obsolete type. Year by year increasing losses fell on their unfortunate owner. His poverty, but not his will, consenting, the ships have been sold at a loss to the omnivorous foreigner. It was some compensation to receive the grateful letters of parents and guardians, and to find that the boys, on the completion of their training, never failed to get berths in the best services. I am glad to know that in the Macquarrie and Illawara, vessels of larger tonnage, sailing under the flag of Messrs. Devitt and Moore, the work begun in those pioneer vessels is still being carried on.

A training ship, organised in all important particulars on the lines already described, has recently been fitted out by the North German Lloyd. To the management of great services such as that of the P. and O., the White Star, the British India, or Union Companies, it would be a small matter to equip a training-ship under their own house flag, following the lead of their German competitors. I hope they will do so.

The duty of the State.

Progressive increase of the reserve of officers.

As I have already said, the aid of the State can only be justified on the ground that we have not sufficient numbers in the mercantile marine with the high qualifications required in those to whom we look as a reserve of officers for the Navy. Such a reserve is indispensable. It was the only means by which an addition urgently wanted could be made quite recently to the lieutenants' list of the Royal Navy. Looking to the future, it is evident that the increase in the list of Royal Naval Reserve officers must proceed *pari passu* with the additions to the strength of the Navy in ships. If the recommendations to which I shall call attention in favour of training-ships for seamen should be carried into effect by the Government, an opportunity will be offered for carrying forward the training of officers on a scale commensurate with the requirements of the great fleet we are creating. The cost of training officers for the Reserve should be met by fees. They would be moderate in amount in comparison with the cost of education on board the Britannia.

Though not directly connected with the subject before us, I may, perhaps, interpose suggestions having for their object the improved efficiency of the officers of the Reserve. To secure the cream of the mercantile marine, the Reserves Office should be assisted in making selections for commissions by an advisory committee of shipowners at the principal ports. All Reserve officers should be probationers until they have served not less than a year in a man-of-war, and been in all respects favourably reported upon by the captain under whom they served. I need not dwell on the advantages which would result from the adoption of these suggestions. They will readily commend themselves to those who know the Reserves.

More discrimination in making first appointments, higher standards of qualification and longer service in the Navy, may involve as a necessary consequence improved pay to the Reserve officers. If such should be the case, and a larger number of desirable billets should be thrown open to the mercantile marine, it will tend to accomplish that which on other grounds is so much to be wished, namely, that advancement in the position of mercantile marine officers which the economic conditions make it impossible to achieve by more direct means.

In closing this portion of my subject, I may appropriately remark that the closer connection with the Navy, which has been brought about through the creation of the Reserve Force, has been of undoubted value to the mercantile marine by raising the status of officers, enlarging their experience, and instructing them how to maintain discipline among large bodies of men.

Seamen.

I pass from the officers to the seamen. From the repeal of the Navigation Laws onwards the necessity has been felt for some alternative means of furnishing that ample supply of seamen obtained under the protective system of former days. There is a general concurrence of opinion in favour of naval training-ships at the great ports. They were recommended by the Manning Commission, to which the first enrolment of the Reserve is due. The Commission proposed that school-ships should be established at the principal ports, capable of accommodating from 100 to 200 boarders on each ship, of whom 100 should be supported by the State. The schools were to be under the Board of Trade, the military part of the training under the Coastguard. It was assumed that in all 2,400 apprentices would be supplied annually by these schools, and that shipowners would be willing to take the whole number. In the altered conditions of the present day the payment of subsidies for taking apprentices has become necessary. School-ships were strongly recommended by the Royal Commission on unseaworthy ships.

The necessity of establishing school-ships.

The Manning Committee of 1894, under the presidency of Sir Edward Reed, recommended that training-ships, or schools with a small vessel attached, should be established round the coast. In the opinion of the Committee, the deterioration of British seamen, as to which many witnesses had spoken, was owing in great measure to an insufficient number of boys being trained. While the Legislature had recently provided for technical education by grants from the Exchequer, there was no branch of training more directly profitable to this maritime country than the preparation of youths at the public expense for service at sea, primarily available for the Royal Navy, but available likewise for the mercantile marine. These unanimous and valuable recommendations have been too long neglected. School-ships at the ports, for apprentices to the Royal Naval Reserve, should be established without delay.

Sea training.

Having established the harbour training ships, the seaman's apprenticeship at sea, no less than that of his officer, demands consideration. Hitherto we have looked to the sailing ships of the mercantile marine to supply seamen for the Reserve. A serious diminution in this source of recruitment has for some time been in progress. Not on sentimental grounds, but upon a serious view of

the grave consequences in the impaired efficiency of our seamen, it is to be regretted that sailing ships are disappearing from under the British flag just as the types were attaining perfection. They are disappearing, not because it is of vital consequence to make a saving of twenty days in the duration of a voyage from Australia or California to Europe with a cargo of wool or wheat, but because there is a small advantage in point of economy of working in favour of a cargo steamer of the great dimensions at which we have now arrived. A very small percentage of economy is all important from a strictly commercial point of view. The offer of sufficient subsidies for carrying apprentices to the Naval Reserve may incline the scale in favour of sailing ships, in which the owners might be prepared to combine suitable arrangements for training with the carrying of cargo. The system of training for the Royal Navy, as indeed for every other Navy, is begun in sailing ships. That able and distinguished officer, Sir Gerard Noel, now Admiral in command of the Reserves, and formerly a captain in our Training Squadron, has, in a recent paper, given his opinion of the value of the discipline of masts and sails. It was emphatically advocated by the late Sir Geoffrey Hornby. It is not less strongly recommended by contemporary officers of the highest authority, such as Sir Frederick Richards, lately the First Sea Lord, and others too numerous to mention. Sir Gerard Noel holds that masts and sails must not be relinquished until an equally effective substitute is found. The only alternative in his view must be the disappearance of the naval officers and seamen as now known, their places being taken by steamship officers and harbour-drilled crews, with none of the attributes of seamen. To a seaman the fact of being at sea in a steamship means that he has rather less to do than when his ship is in harbour. How different the life in a sailing ship, where every change of weather requires unceasing attention to the setting, trimming, and reefing of sails! Such sea experience keeps all on the alert. In sailing ships the younger officers find themselves in really responsible positions, not only as to the safe conduct of their ships, but also as to the safety of the men employed in working the sails and spars.

Training under sails.

The system abroad. Subsidies.

In this connection let us not neglect to take into view the policy which is being pursued in foreign countries, under the most vigorous and efficient administrators. As an encouragement to their employment in the mercantile marine, in which their reserves of seamen are reared, subsidies are paid to the owners of sailing ships on a liberal scale both in France and Italy. In France the bounty on construction is 65 frs. per ton. The mileage bounty is

at the rate of 1·70 frs. per ton per thousand miles sailed. As a result, construction under the French flag shows considerable progress, and that at a time when sailing ships are disappearing altogether from beneath the British flag. The finest sailing ships which visited the port of Sydney during my residence in Australia were French. The house of Bordes, of Bordeaux, has taken the lead in the revival of the fleet of sailers. The increase in the tonnage belonging to the firm is hardly exceeded in the most successful steam shipping companies of Great Britain. In the United States the duty of the State in relation to the training of seamen has not been neglected. Training ships lent by the Navy have been sent to sea by the States of New York and Pennsylvania. In these ships there is little to differentiate from the training ships maintained by boys of the War Navy. The naval authorities have lent their aid as well in the training of officers as in that of seamen. The Enterprise has been fitted out as a school-ship; the boys taken on board have passed a high scholastic examination, and are entered for a three years' course of training designed to fit them to be efficient officers of the mercantile marine. In the United States it has become the settled policy to give encouragement to shipping by subsidies. A Bill is now before Congress prepared by the Committee of the Senate on Commerce, authorising the payment of distance bounties to selected sailing ships, at the rate of 1 per cent. per gross ton for every one hundred miles.

The time has now come when the adoption of every practical means to prevent the disappearance of British seamen from our foreign-going ships should be considered. As a proposal for discussion, I have from time to time put forward a scheme based on the recommendations of the Manning Commission of 1860. It was proposed that the Government should train boys for the Reserves by entering them as apprentices indentured to an official of the Board of Trade and to remain under his supervision. They were to be sent to sea for four years in selected sailing ships, and afterwards join the Reserve. A subsidy was proposed, of £20 to the shipowner and £15 to the apprentice, on the satisfactory completion of the apprenticeship.

The decline of the British seaman must be checked.

Under the conviction of the necessity for taking some action, the Imperial Government, at the close of the session of 1898, introduced a clause into the Merchant Shipping Act providing for a reduction of the light dues to owners of ships carrying apprentices. The scheme failed because the inducements were inadequate. I have endeavoured to show that the increasing requirements for the Naval Reserve can only be met by dealing with the training of boys on a comprehensive plan and with the aid of the State. Better terms

should be offered to the shipowners and stricter conditions insisted upon. The sea training of the boys we enter for the Reserve should, as I have said, be in sailing ships only. I offer as a suggestion, thrown on the table for discussion, that the bounty for apprentices might be at the rate of £25 for the first year, £15 for the second, and £5 for the third year. No boy should be eligible who had not passed through the harbour training-ships at the ports. The number of boys to be entered in the harbour ships being determined with reference to the requirements of the Naval Reserve, this condition would limit the charge to be borne by the Exchequer. We should pay for the training of reservists and reservists alone.

Bounties for apprentices.

Government apprentices should join the Navy.

On the completion of their apprenticeship the Government apprentices should join the Navy. After serving in the fleet, they would return to the mercantile marine, where their high qualifications would secure good employment. Their pay would be supplemented by their retainers as reserve men, and by the prospect of a pension.

In conclusion, it has been my endeavour to show that a strong reserve is essential for the Navy, the number of prime seamen in the mercantile marine is diminishing, and without the aid of the State in training must continue to diminish. On every occasion when a public inquiry has been held the establishment of training-ships at the ports has been urged. In the still more important work of training at sea I have endeavoured to show that timely and effective aid is needed on the part of the State in order to provide for the requirements of the Royal Naval Reserve. Working on the lines briefly indicated, the State may be relieved of the cost of training excessive numbers for the Navy, while assisting to rear up a body of men equally useful in peace and in war. I close with the impressive words in which the Commission on Manning ended their report: "We possess in the Merchant Service elements of naval power such as no other Government in the world enjoys. Hitherto no sufficient organisation has existed for securing the immediate command of those resources for the defence of the Empire. It is in the power of the Government to draw closer to the State, at the moment of danger, the loyal enthusiasm of our noble mercantile marine. While the primary object of any scheme for training at the public charge is the protection of the country from the hazards of war, it is an advantage not lightly to be valued that the enrolment, training, and maintenance of a Reserve must improve the position and elevate the character of British seamen of both the services, and knit them together in the firm bonds of reciprocal feeling and of common interest."

BRASSEY.

CHAPTER VIII.

Fleet Auxiliaries.

It is now generally conceded that mercantile auxiliaries are a necessity with a modern fleet; but, so far as the public are aware, no attempt has been made to formulate types or lay down any fundamental rules for tonnage, speed, or equipment. We have, it is true, a torpedo depôt repairing ship, and have acquired a military hospital steamer, but obviously our requirements embrace, in addition to these, store ships, colliers, ammunition vessels, and condensing and repairing ships. Nor can we excuse ourselves in the case of colliers by pleading inactivity in other nations, since we read in the press that both America and Russia contemplate the construction of fleet colliers, whilst the former Power has also a repairing ship in hand. It may certainly be said that, though our requirements are well defined, the details connected with the provision for them are not so clear, but this is precisely the plea urged for embarking in experimental types which should establish standards for future guidance.

Classes of auxiliary ships.

Beginning with fleet colliers, it may be asked whether, at this moment, we have any that are suitable to accompany a fleet, and what should form the qualifications of the class. I should assign the first place to speed, a sufficiency of which is necessary to enable such vessels to keep pace with a battleship squadron, and this may be put at 16 knots. Then an adequate amount of coal in their bunkers to make them independent of the fleet supply should be aimed at, and this I should put at a thousand tons (to name a figure for discussion), whilst five thousand should be carried for the fleet. The Americans are said to contemplate the building of fleet colliers of 15,000 tons. It is true that the congested state of the American yards, due to the extensive building work now in hand, has not enabled the colliers yet to be laid down; but, as I said in my paper, read on December 12, 1900, at the Royal United Service Institution, if the intentions of the Americans are rightly interpreted, it would appear that our astute cousins, with a much smaller navy, were already working in the direction I had indicated. The size of these intended colliers was not made clear, but, if three of 15,000 tons each are proposed, I should consider it a mistake, as they would not be so easily handled or cleared if of that

Fleet colliers. Essential qualities.

size, and the more colliers you can get alongside individual ships of a fleet at the same time, the sooner will that fleet be coaled and ready for further service; hence the greater advantage of possessing a larger number of small colliers.

Then the details of equipment require to be worked out by the light of all experiences up to date, such as the size and number of hatchways required, derricks, and steam-winches, bags, baskets, &c. An equipment also for coaling ships at sea should be fitted and thoroughly tested for future guidance.

Coaling in the Channel Squadron.

In respect to suitable fittings no difficulties should be found, as the Channel Squadron has a wide range of experience in coaling from colliers, whilst the Mediterranean Fleet has summer practice in the same direction, and in all cases the Admiralty very wisely insist on a full report after such coalings, giving all details worthy of record in connection with the general quality of the collier, her outfit of winches, derricks, &c., and the size and convenience for unloading of her hatchways. As celerity in coaling will be of great importance in war time, the healthy competition afforded by the Channel Squadron in taking in coal is of great value, and it is satisfactory to note that the following excellent results were attained on the last occasion of coaling, as given by the *Naval and Military Record* of February 14:—

The five battleships constituting the Portsmouth Division of the Channel Squadron have completed coaling for the first time since a commander, with a chief boatswain as his assistant, has been placed in control of the depôt, and the results are somewhat remarkable. It has been clearly demonstrated, that, in the winter, any ship demanding anything up to 1500 tons, or even more, can be supplied during one day's daylight. To effect this, three cranes were kept at work on the shore side, and on the water side were two Temperley vessels with two transporters in each. The question, therefore, arose whether the crew could stow the coal as rapidly as it could be shipped. It was further determined to give, as far as possible, each ship the same chance, but this condition could not be fully observed, for, while four of the vessels coaled in daylight, the Prince George had three hours of artificial light—namely, from 5.30 to 8.30 p.m. In each case, however, every detail of the operation was carried out by the ship's companies, the only outside assistance being rendered by the dockyardmen, who worked the winches on shore. The work, even to bringing the lighters alongside and the running of the coal to the cranes, was performed entirely by the crews. So keen was the competition that not only lieutenants but chaplains, surgeons, and paymasters threw themselves into the work, and wheeled their loads with the energy and rapidity of trained stokers. The following table gives the return for each ship:—

	Tons shipped.	Average per hour.
Hannibal	943	170
Prince George	1220	187·7
Resolution	1215	169·5
Majestic	1230	200·3
Mars	1070	203·78

About an hour before coaling ceased the Mars had averaged 218 tons an hour, but at this point the fuel accumulated on deck, the men below being unable to trim it as rapidly as it was sent down; and, though this broke down her average, she for the present holds the record, so far as the Portsmouth division of the Channel Squadron is concerned. It should be mentioned that the competition was instituted without any advice or recommendation from the Admiralty, but in order that Commander Heathcote, who has relieved the dockyard staff officer of the responsibility, might obtain information for his guidance in the event of an emergency arising.

After determining the type of the future fleet collier, two should be built at once for trial and report, one being attached to the Channel Squadron, the other to the Mediterranean Fleet, and both vessels should be kept constantly running, till all debatable points are set at rest.

Engineers store vessels.

Next to coals, engineers' stores are probably the most vital requirement of a fleet, and these would stow in any cargo vessel, but the same amount of speed—viz., 16 knots—must be provided. Also in these vessels the facilities for rapid clearance should be a *sine quâ non*, and, if one or two are built for trial, the development in this respect shown by the mercantile marine in certain of the latest cargo and passenger ships affords a good lead, as some of them, I am informed, can discharge at the rate of 2000 tons in twenty-four hours.

Hospital ships.

Hospital ships have already been fitted by that enterprising nation, the Japanese, and it is probable that their Minister of Marine, if asked, would courteously place the drawings at the disposal of our Admiralty. We have also an example in this direction afforded by the military hospital ships sent to the Cape, and if the rumour is correct that the Admiralty have purchased the Maine, and intend sending her to the Mediterranean, the value of her fittings can be tested, improvements suggested, and, what is of great importance, bad fever cases given a better chance of "pulling through" when the fleet is away from the vicinity of a hospital.

Ammunition vessels.

Ammunition vessels in attendance on a fleet will be of great value after an action, as even at Alexandria the want of shell made itself acutely felt after a comparatively short bombardment, in which no quick-firing or breech-loading guns were used. The fitting of such vessels requires to be carefully thought out, as all magazines should be able to be readily flooded, should be placed below the water-line, and should be well lighted electrically, with every facility for rapid supply to several ships at the same time. To keep the metacentric height right some weights would probably have to be carried above the water-line, and these might consist of repairing plates and plant, warrant officers' stores, etc. The speed of these vessels should not be less than 16 knots, and I would suggest that a typical ship be at once fitted out and attached to the Mediterranean Fleet in the summer, and the Channel Squadron in the winter, to test fittings and suggest improvements by the ships drawing upon her for all ammunition expended for quarterly practice.

Provision and store ships.

Provision and store ships could be more readily extemporised, as any cargo steamer of sufficient speed would probably answer all requirements, but the stowage of everything must be carefully considered, as it should be possible to get at anything required

quite easily and without undue disturbance of other portions of the cargo.

As has been suggested by Lord Charles Beresford, let a cold meat store ship be kept in view, as the Americans have given us a lead in this direction, and there seems no reason why fresh meat and vegetables should not assist to relieve a war strain by supplying a more generous diet than that afforded by canned or salt provisions.

Condensing ships.

Condensing ships are now also recognised as a necessity in a war squadron, and one or two have already been attached to the fleet in the annual mobilisation, but those tried were, I understand, anything but a success, which points to the desirability of providing a well-thought-out specimen for trial in the Mediterranean or Channel Fleet in order to determine an efficient type. A vessel of this kind would also at times be very useful at such places as Gibraltar and Malta, where shortage of water occasionally occurs, and might also be a great boon in certain military operations. To quote historical examples, the base in the Abyssinian campaign was kept going by distilled water, the elephants alone using some tons for their daily wash down, and this water was furnished at a great cost by the transports, some of which were kept steaming round the anchorage for condensing purposes only. Crete was another instance of the utility of distilling ships, one being attached to Candia to supply the troops with wholesome drinking water.

Repairing ships.

Repairing ships must of necessity be of a special type, and one or two should be prepared for trial and report in order to determine a pattern. These vessels might carry spare feed-pumps for boilers, as also other small spare auxiliary engines, since the constant running of the auxiliary machinery is a source of frequently recurring defects, which in many cases could be readily made good by shifting the engine or part of it in far less time than it could be repaired, and this would be of great importance in war time. And, if all the auxiliary engines could be kept to standard types and gauges as far as possible, their repair would in all cases be much facilitated. In the matter of interchangeability of parts of nearly all machinery we have much to learn from the Americans, and the chances are that their repairing ship under construction will be admirably thought out in every detail.

The extensive need for fleet auxiliaries

The foregoing is only an outline of fleet auxiliary requirements, but this should be filled in as soon as possible by a well-considered scheme in detail, in which everything conducing to their efficiency should be worked to in specimen vessels for practical trial and report. The types being settled, it will be requisite to determine the total number of each to be allotted to every fleet or station, and an officer

of high rank and wide professional knowledge in the Mediterranean puts the requirements of that station alone at upwards of thirty auxiliaries, thus affording evidence of the large demands which will have to be made on the mercantile marine to supplement what we build ourselves. Then arises the question: Can the mercantile marine furnish the number of vessels required at short notice, of sufficient speed and general adaptability to follow a pattern ship of each type when such is evolved? Personally I should doubt it, except at the cost of great disorganisation of the carrying trade, which in a war would probably become more acute by the extra demands on it, and possibly by some of the slower "tramps" dropping out, thereby throwing a greater carrying strain on the faster steamers.

The provision of ships and manning.

Therefore it will be as well (if not already worked out) to ascertain how far we can rely on our merchant service for the balance of the fleet auxiliaries required, and supplement the deficiency by building our own auxiliaries as a component part of the Royal Navy. And if we again resort to Imperial troopers, and construct vessels capable of a dual duty as either auxiliaries or troopships, we shall save the extravagant expenditure of coal which is entailed by running our cruisers with relief crews,* as also the wear and tear of their machinery, and have ready to our hand on the outbreak of a war some well-tried steamers, which would fall naturally into their places as auxiliaries without any question as to their aptitude. Then due consideration must be given to the manning of the auxiliaries, as it is evident that their crews cannot be drawn from the fighting line, but equally evident that they must be forthcoming when required, and this points to the necessity for some reserve in this direction capable of being called upon at short notice; and where are we to look for it? Possibly the watermen and bargemen and local steamer stokers might be induced to join a reserve in which no drills are required, and probably other sources may be tapped, but the numbers required will be considerable, as one hundred auxiliaries at the modest figure of one hundred men in each crew will absorb 10,000 men, and this at a time when demands upon the naval labour market will be unprecedented.

It may be pertinently asked why this question of auxiliaries has now become a prominent one, and, if pressing, why it was not attended to long ago. We may hopefully assume that this has been the case, but we have no evidence to that effect, nor has it been alluded to by the First Lord of the Admiralty in any of the explanatory annual statements which usually precede the Naval Estimates.

* The Europa burnt 20,000 tons of coal in steaming to Australia and back with relief crews.

Mr. (now Lord) Goschen certainly, in his 1900–1901 statement, touched upon fleet coaling as follows:—

Arrangements connected with the coaling of the fleet have been under the special consideration of the board. Steps have been taken to increase the reserve stocks at certain of our coaling stations, and experiments are in progress with the object of selecting a patent fuel suitable as a special reserve on the more distant stations. Arrangements are being made for the institution of a system of supply of coal to certain fleets and dockyards by colliers directly under Admiralty control, a successful experiment in this direction having been made in the course of the year. Efforts are being made to widen the area of supply as far as practicable, and to take advantage of the coal resources of the Colonies when local coal can be shown to be of suitable quality for her Majesty's ships, and can be supplied at reasonable rates. Steps have been taken to provide for a certain quantity of New Zealand coal from the West Port Collieries for use on the China station, and local Australian coal is now used on the Australian station as far as circumstances permit.

Lord Selborne, also, in the Memorandum presented with the Estimates of 1901–2, alludes to the coaling of the fleet, and states that additions have been made to the coaling craft, and that other ships will be equipped with modern appliances.

This, so far as it goes, is satisfactory, but it does not touch the question of properly constructed colliers of sufficient speed and capacity to accompany a fleet in war time, for it may be surmised without fear of being in error that the colliers named as "directly under the control of the Admiralty" have no greater speed than 10 or 11 knots, and no larger storage than 3000 tons of fleet coal.

In conclusion, it cannot be too strongly urged that the fleet auxiliary question is of paramount importance, that now is the time to thresh out its multifarious details, both personal and material, and to put the service in such a condition of organisation and efficiency that hostilities will find us fully prepared with a fleet equipment of auxiliaries for every station, capable of being mobilised and despatched on their important duties as quickly and as readily as the A Division of the Fleet Reserve.

J. O. Hopkins.

CHAPTER IX.

THE TRANSPORT OPERATIONS TO SOUTH AFRICA.

The conditions of the work.

THE transport of the troops to South Africa during the war has been by far the most considerable operation of the kind in which any nation has ever engaged, and the more one thinks of the embarkation and despatch of the troops, the more profoundly is one impressed with the significance of the great historic success. The distance at which the hostilities were waged, the vast numbers of men and animals employed, the huge aggregate of stores of every class to be conveyed, all demanded the resources of a merchant marine such as is possessed by no Power save our own. No other nation has ever put into the field an army of a quarter of a million men, with lines of communications covering 7,000 miles of sea and land, provided with horses, transport animals, field and siege guns, ammunition, waggons, vehicles, traction-engines, bridge-building, pontooning, and telegraph materials, and tents, tools, and equipments, as well as with food, forage, and hospitals, not to speak of the thousands of objects that are necessary for the efficiency and the operations of forces in the field.* These forces were to be employed in a country that may be described as almost destitute of military supplies, and where few requirements beyond waggons and draught oxen could be procured, and they were to continue on active service for a period which has not yet come to an end. From the strategic point of view the naval transport was simplified, owing to the fact that we were not at war with a sea power, and that beyond a general patrol of the route to South Africa no special precautions were called for. On the other hand, having regard to national considerations, it was necessary that the immense strain thrown upon our merchant marine should not dislocate commerce or industries, and should not disarrange the rates of freight. When we remember that this was accomplished with complete success, we recognise that the fact speaks volumes

* The siege train despatched in the Tantallon Castle in December, 1899, consisted of eight 6-in. howitzers on heavy mountings and carriages, and four 4·7-in. guns, with very cumbrous platforms, which weighed 86 cwt. each. The ship also carried twenty pontoon waggons, fourteen other waggons, 5,000 boxes of shell, 400 cases of 4·7-in. cartridges, and a great weight of other ammunition. She also conveyed 470 officers and men.

for the strength of our commercial fleet, and there need be no surprise that the achievement has aroused the admiration of the world, for it has been a revelation of resource, energy, organisation, and national spirit, for which there is perhaps no parallel, as also a triumph of good management and business-like capacity, reflecting the highest credit upon all concerned.

Its magnitude.

The magnitude of the operations undertaken by the Transport Department of the Admiralty, under the direction of Rear-Admiral Bouverie F. Clark, can only be appreciated by the evidence of statistics, though these can but imperfectly suggest the vastness of the task. Before the war broke out, and in the period from June to September, 1899, preliminary reinforcements from Home and the Mediterranean, to the number of 8,168, reached South Africa. The following table shows the total number of officers and men landed at the various South African ports from all sources during the succeeding period, from October 1st, 1899, to October 31st, 1900:—

Troops conveyed.

	From Home and Mediterranean.	From India.	From Mauritius.	Colonial Contingents.	Totals.
1899.					
October	1,632	6,004	450	..	8,086
November	42,642	..	..	1,922	44,564
December	23,548	572	..	689	24,809
1900.					
January	25,134	1,007	..	..	26,141
February	19,259	391	..	2,625	22,275
March	37,144	315	..	953	38,412
April	21,425	19	..	2,750	24,194
May	11,554	..	..	1,734	13,288
June	9,795	..	..	918	10,713
July	7,675	..	..	..	7,675
August	1,765	..	..	..	1,765
September	4,143	..	..	..	4,143
October	3,267	..	..	..	3,267
Totals	208,983	8,308	450	11,591	
			Grand Total.		229,332

The subsequent reinforcements to South Africa up to January 31st, 1901, were 8,072. We thus reach a grand total of 245,572 officers and men; but this aggregate has since been very largely increased, and the despatch of transports still goes on.

It must, however, be remembered that the transport service has not merely been for the conveyance of the forces from certain places

to South Africa. It was, for example, necessary to detain certain of the transports, to the number of about twenty, on the Cape station, always in readiness to move a division from Cape Town to Durban or intermediate ports, or *vice versâ*, according to the military requirements. Moreover, provision had to be made for conveyance to England, India, and the Colonies of returning troops and invalids, sick, and wounded. The total number in the last categories up to January 31st, 1901, was returned as 58,911.*

Horses and mules.

Scarcely less important than the men were the horses and other transport animals employed in the field. The total number of horses from Home, India, Austria, America, and Australia, including those with the Colonial contingents, embarked for South Africa up to October 19th, 1900, was 124,834. The mules were conveyed from North America, Spain, Italy, India, England, Cyprus, and Australia, and the total number landed in South Africa from October, 1899, to the end of October, 1900, was 62,690.

Stores.

It is unnecessary to burden these pages with a classification of the military and other stores, vast in variety as in volume, that have been transported from various points, and chiefly from England, to South Africa. But it will illustrate the magnitude of the work if I take the month of December, 1899, premising that, in some of the early months of 1900, the aggregate was still higher. In the month selected the total bulk of stores conveyed to South Africa in transports and freight-ships may be estimated at 52,000 tons, while ships not taken up by the Admiralty conveyed, during the same period, nearly 17,000 tons of hay, about 7,000 tons of oats, over 600 tons of meat, and about 1,000 head of cattle, besides nearly 15,000 tons of coal.

Transports chartered and freight-ships employed.

The troops were principally embarked in transports hired by the Admiralty, of which there were 102, chartered at a rate estimated on their gross tonnage—perhaps I shall not be far wrong in saying that the mean rate was 20s. per ton per mensem—and these were under their own officers, and were manned by their own men, whose wages were paid by their owners; but the vessels were completely at the disposal of the Admiralty, who coaled them, superintended the order of embarkation, fixed the dates of departure, and, in a word, had complete control of the whole operation. The freight-ships were in a different category altogether, being hired to carry so many men, horses, or tons of goods, at an agreed rate for the voyage, the management remaining in the hands of the owners. For example, the great

* It was estimated that, up to the end of March, 1901, about 50,000 officers and men, sick and wounded, had been disembarked at Southampton, many of them requiring very special handling at the port.

majority of the boats of the Union-Castle Line were so employed, and did splendid work. I am indebted to a table prepared by Dr. Benedict William Ginsburg, showing the number of ships and the gross tonnage of each shipping company engaged in chartered transport work.*

Ships.	Companies.	Gross Tonnage.	Ships.	Companies.	Gross Tonnage.
9	Elder, Dempster & Co.	52,164	2	Orient Line	10,953
6	Cunard S.S. Co.	38,414	2	Pacific S. N. Co.	10,355
4	Leyland Line	36,756	2	Lamport and Holt	10,287
5	West India and Pacific S.S. Co.	33,275	2	Lund Line	10,156
4	White Star Line	33,270	2	Bibby Line	9,969
6	P. and O. Co.	32,103	2	Geo. Smith and Sons	8,516
6	B. I. S. N. Co. 13,739 B. I. Association 16,959	30,698	1 2	J. Glynn Union Line	7,359 7,139
5	Allan Line	29,559	1	Rankin, Gilmour & Co.	6,900
4	Dominion Line	28,019	1	Welsford & Co.	6,215
4	Johnston Line	26,534	1	Asiatic S. N. Co.	5,660
5	Castle Line	25,831	1	Federal Line	5,464
3	Manchester Liners	16,682	2	Plate S.S. Co.	4,767
3	Anchor Line	16,559	1	Atlantic Transport Co.	4,212
2	British Shipowners	14,651	1	Lawther, Latta & Co.	4,009
2	Harrison Line	13,330	1	McGregor, Gow & Co.	3,455
2	National Line	13,162	1	Houlder Bros.	3,444
2	Wilson Line	12,382	1	Houston Line	3,261
2	Royal Mail S. P. Co.	11,491			
2	Brocklebank Line	11,353	102	Grand Total	598,354

In addition to these vessels, thirty-one ships of the British India Steam Navigation Company, with a gross tonnage of 109,730, were chartered for the transport of troops from India to South Africa. We thus arrive at a total of 133 ships, with an aggregate tonnage of 708,084. This immense fleet did not, however, represent anything like the full number of vessels engaged in transport operations. Troops were conveyed in ships engaged in the regular service to South Africa, and large numbers of vessels were employed in the transport of Colonial contingents, and others again in the conveyance of horses, mules, and stores. Indeed, a War Office return of "Embarkations in connection with the South African Compaign, 1899–1900 (up to October 19th, 1900)," which was issued on March 1st, 1901, indicates that 283 transport and freight ships had been employed in the operations, and, of course, many of these had made repeated passages to and fro.

Resources of the mercantile marine not exhausted.

Vast as was the undertaking, the resources of the mercantile marine were by no means exhausted, in relation to which matter the following statement, based on practical experience, made by Sir Thomas Sutherland at the meeting of the Peninsular and

* "The Syren and Shipping," January 2nd, 1901.

Oriental Steam Navigation Company on June 12th, 1900, may be quoted:—

Our share in the work has not been a very large one, as none of our mail steamers have been engaged in it; but still we have transported altogether about 24,000 men, and our ships have run in connection with the service a distance of 300,000 miles. But what applies to our own service in regard to the efficiency with which this work has been carried out, applies to the mercantile marine of the country generally. And I venture to say that for the first time the country has realised, in the manner in which this expedition has been carried out, the great strength which we possess in the mercantile marine of Great Britain. Gentlemen, I assure you that its strength has not nearly been put out in this expedition, considerable as the work has been. I am satisfied that it would have been easy for the merchant shipping under our flag to have carried double the force that has been carried out to South Africa, and in the same time. And I argue that from the simple premises that the P. and O. Company, in the Crimean War, when they had, comparatively speaking, a small number of vessels, and when none of those vessels, with one exception, exceeded 1,800 tons, carried in that Crimean War 60,000 men and 15,000 horses—I say, if it were ever necessary for the great strength of the mercantile marine to be put out in the defence of the country, it would produce much greater results even than the great efficiency which has been shown in connection with the South African expedition.

Shipping companies engaged.

It will be seen from the list of companies that Messrs. Elder, Dempster and Co. contributed very largely to the fleet of transports. They also took a great part in the work of transporting animals in freight-ships from various ports, bringing about 20,000 horses and 17,000 mules, and Strathcona's Horse crossed the Atlantic in one of their vessels. Six ships of the Cunard Line were engaged in the transport of troops, and conveyed outward 1,050 officers and 22,900 men, and homeward 465 officers and 6,800 men. This Company also conveyed to South Africa 3,972 mules and large quantities of stores.* The White Star liners made excellent troopships, and the Afric, Medic, and Persic, belonging to the new Australian line of the Company conveyed men, horses, and stores from Australia to the Cape. The Cymric was one of the finest vessels taken up by the Admiralty, and on one occasion she carried 55 officers, 1,497 men, 430 horses, 19 guns, and 43 vehicles. The total numbers carried by the line were 17,393, of whom 2,494 were from the Cape to England, while the horses numbered 3,659. In addition to the ships of the Allan Line which are shown in the list, the Sardinian, Laurentian, and Pomeranian were taken up by the Canadian Government, and carried very large numbers of troops. The Dominion Line contributed the Canada, Majestic, and Umbria, very fine Transatlantic liners; some very erroneous statements were made in regard to the Majestic which are alluded to below. It is unnecessary to allude here to the many other lines which were engaged in this work, but it may be said that the Peninsular and Oriental and the Union-Castle Line did very admirable work. The Manchester Liners—a new company—contributed three remarkable vessels which had been built expressly

* These particulars are up to January, 1901.

for the Montreal cattle trade, but which were adapted for the transport of troops and horses with very great success and satisfaction both to the company and to the troops conveyed in the ships.

Transport naval officers at British ports.

The following is a list of the naval officers in principal charge of transport duties at English ports during the war:—

Port.	Officer.	Period.
London District (Royal Albert Docks and Tilbury)	Captain Charles H. Coke . .	30th September, 1899, to 15th March, 1900.
	Captain Edward E. Bradford .	16th March to 18th June, 1900.
	Commander (retired) Charles W. P. Allen	18th June, 1900, to present time.
Southampton District	Captain William G. White. .	30th September, 1899, to 9th July, 1900.
	Commander (retired) Reginald Y. Heriz	10th July, 1900, to present time.
Liverpool District	Captain Honourable Hugh Tyrwhitt	30th September, 1899, to 18th March, 1900.
	Captain Charles H. Coke . .	19th March to 8th July, 1900.
	Captain (retired) Francis J. J. Eliott	9th July, 1900, to present time.

At Queenstown the senior naval officer, Rear-Admiral A. P. M. Lake, was *ex officio* in charge of transport duties.

The inspection and taking up of vessels.

In relation to the taking up of transports by the Admiralty not much shall be said here. The operation implied a thorough inspection of the ships for selection and the conversion of them for the accommodation of troops. In the first place the inspecting officers had to investigate the suitability of the ships, and it may be said, broadly speaking, that a satisfactory transport should be capable of carrying a number of men equal to 25 per cent. of her tonnage. They had to consider questions of ballasting, speed, coal consumption, etc., and then to take account of the removal or adaptation of existing fixtures, and the allotting of space for various purposes, in strict accordance with the number of troops to be carried, including the provision of hospital accommodation. The separation between the duties of the naval officers in charge of transport duties at the ports and those of the military embarkation officers was clearly marked. The naval authorities were responsible for taking up, fitting, coaling, and otherwise preparing the vessels for sea. They had to give all orders for the movements of ships at the ports on arrival and depar-

ture, and no transport could leave without an order from the divisional naval transport officer. In this officer's charge was the provision for the safety and expedition of all embarkations of men, horses, and stores, as were all arrangements for docking and like matters. He was also responsible for the safety and disembarkation of invalids, which was very weary work. On the other hand, the military embarkation officers gave orders for the marching of men on board, and had, of course, charge of all the troops ashore; and before a transport could leave there was a final inspection by a board of naval and military officers, who framed a report on the ship and the operation.

Admiralty management.

In the early part of the war many complaints were raised against the management of the Admiralty, and it may be admitted that some few ships were taken up which proved not altogether suitable; that there was occasional failure, perhaps, to reach the very highest level of efficiency or economy, and that some ships broke down; but this is no more than to say that the stupendous work was subject to those conditions which are inseparable from the conduct of all business, and the fact that everything worked so smoothly, and that so few defects were revealed where so many were possible, is testimony enough to the splendid character of the achievement. The very fact that the mail and passenger services were not dislocated, and that the sea-borne supplies of food and raw material were not interfered with, has contributed to hide from public view the great work that was going on.

Charges refuted.

It was stated that preconceived ideas impeded efficiency, that unsuitable ships were taken up, that questions of loading, berthing, and feeding should have been left to other hands, and that a good deal of red tape characterised the operations. I have no hesitation in declaring that many of these statements were based upon imperfect information. It was asked why the Admiralty failed to secure the fastest transports, but the answer is because they acquired such as were most suitable for the long voyages to be undertaken. It was under the pressure of popular clamour that the Majestic, a fine Atlantic greyhound, was taken up. She was altogether beaten by the Briton, and the rumour was then circulated that she had been ordered to proceed under her proper speed. This was an entirely erroneous statement. As a matter of fact, the Majestic was ordered to keep enough coal on board to proceed to Durban if required—an order which was given to every transport leaving British ports for South Africa—and she could not steam at her high speed. There were complaints from time to time that sufficient transports had not been taken up for all the Yeomanry, but it should not be forgotten that

this patriotic force began by attempting to provide its own transport, and only came to the Admiralty when the effort failed, and, of course, an unlimited number of satisfactory ships was not available. The *Times* correspondent at the Albert Docks, in relation to this matter, stated that only those who had closely followed the practical details involved in the provision of ships were aware of the labour thrown upon the Transport Department, and could realise how well the task was performed. Justice had not been done to the naval officers to whom the selection, fitting out, and despatch of transports was entrusted. It was work not much in the public eye. Another somewhat wild complaint was that the Admiralty had not taken up the whole of the White Star Line and other mercantile fleets. People who made this reproach forgot that it was an object not to dislocate the service of any company, and the White Star Line, like the Peninsular and Oriental and the Union-Castle, made a notable record. Among the ships it contributed to the transport fleet was the Cymric, of 22,552 gross tonnage, which was probably the finest vessel taken up. As a transport she was really three ships in one, a passenger, a trooper, and a horse-ship, with ample space and every convenience, and on one trip she carried 55 officers, 1,497 men, 430 horses, 19 guns, and 43 vehicles.

The shipping companies and the Admiralty

In relation to many statements circulated to the disparagement of the Admiralty in its management, I may say that I have the authority of several of the great shipping companies for expressing complete satisfaction with what was done. "The Admiralty arrangements were conceived on sensible and effective lines. The changes made in the ships chartered were necessary to enable the number of men to be carried whom the War Office desired to send. The work necessary to fit the vessels for service was not excessive. There was nothing excessive in the fittings; everything done was useful and necessary. The fittings already in the ships for carrying cattle were used for the transport of mules and were quite satisfactory." For the transport of men the ships were fitted in a manner thoroughly good, comfortable, sensible, and wholesome, a statement in which, I believe, many companies will concur. It is obvious that the Admiralty officials had to work upon a fixed plan, and that exceptions could not be made to accommodate some shipowners without causing grievous complaints on the part of others. The use of hammocks was made necessary by the great number of men to be carried. The ships of the Manchester Liners were fitted with the latest improvements for the conveyance of cattle, but the company recognised that they could not be employed for the transport of horses. Upon this point they were a good deal exercised, but came to the conclusion

Horse transport.

that their fittings could not be utilised except possibly by great alterations, at a cost much exceeding that of the Admiralty fittings, which fittings in the opinion of the company's officers were most excellent for the purpose. Of course, in spite of the excellence of the fittings, and of the good accommodation provided, horses were lost, as might have been expected, considering that all sorts of animals, seasoned and unseasoned, were necessarily shipped owing to the great pressure at one period of the war. Doubtless experience of horse transport in the early part of the war contributed to better results later on. It may here be remarked that the total number of horses lost from October 1st, 1899, to October 31st, 1900, was 6,193 (117,738 landed), and of mules, 2,174 (62,690 landed).

Horses and mules lost.

I venture to quote the following opinion expressed by a leading shipping company in regard to the general question of Admiralty management: "We have seen from time to time various letters and comments in the daily press as to the red tapeism, etc., manifested, and as to the obstinacy, etc., of the Admiralty officials. We can only say that these letters and comments have evidently been made by people who have not had experience of the work, and who like to air their own ideas without knowledge. We think we can speak with some experience, and we can most unhesitatingly say that the consideration which has been given to any suggestions made by ourselves to the Admiralty and their officials, the courtesy which we have received from them, and the business-like way in which all matters have been conducted by these officials, call from us for the very highest expressions of satisfaction and praise."

Victualling the troops.

In relation to the victualling of the troops at sea various opinions have been expressed. On the whole the troops preferred the food supplied by the companies, it being more palatable than the Government rations. These were nearly similar to those supplied to seamen in the Fleet, and, the British soldier having generally been brought up on the rations of the shore, his stomach does not relish salt beef, pork, etc. Later on, however, most of the transports were victualled by their owners, and although this method was more expensive than the scale of Government provisions, it gave much more satisfaction to the men, and the country has not grudged any extra cost involved. It was the general opinion of the shipping companies that it was a wise step to allow them to undertake the catering. The Manchester Liners were catered by the company from the very beginning, and the following bill of fare, indicating what was provided for the Regulars, will show the variety of food that was supplied. In the case of the Yeomanry, by the addition

of a few pence from the Admiralty, the menu was very considerably extended:—

	Breakfast.	Dinner.	Tea.
Sunday	Irish stew, fresh bread, coffee.	Soup, fresh beef, carrots and turnips, potatoes and plum pudding.	Fresh bread, jam, tea.
Monday	Porridge, fresh bread, coffee.	Soup, boiled mutton, potatoes.	Fresh bread, marmalade, tea.
Tuesday	Curry and rice, fresh bread, coffee.	Soup, salt beef, potatoes, apples and rice.	Fresh bread, jam, tea.
Wednesday	Irish stew, fresh bread, coffee.	Soup, fresh beef, potatoes.	Fresh bread, marmalade, tea.
Thursday	Porridge, fresh bread, coffee.	Soup, boiled mutton, carrots and turnips, potatoes, plum pudding.	Fresh bread, jam, tea.
Friday	Curry and rice, fresh bread, coffee.	Pea soup, salt pork, calavances, potatoes, sago pudding.	Fresh bread, marmalade, tea.
Saturday	Irish stew, fresh bread, coffee.	Soup, fresh beef, potatoes.	Fresh bread, jam, tea.

Poultry to be given with pork for dinner one Sunday on passage in lieu of fresh beef.

Work at British ports. Southampton.

A large number of transports left the Thames, and some the Mersey. Excellent work was done at both ports, but it is worthy of note, as a matter of future reference, that, in the early part of the war, when Captain Charles H. Coke, R.N., and Commander Christopher Cradock, R.N., had charge of the operations at the former, progress was more than once impeded by heavy fog. But the chief burden of the work fell upon Southampton, where the operations were attended with remarkable success. The very anxious, responsible and laborious work which fell first upon Captain Graham White, R.N., as Divisional Transport Officer, and afterwards upon Commander Reginald Yorke Heriz, R.N., assisted by Commander W. W. Barnard, an expert in the fitting of ships, was most admirably performed, while Lieutenant-Colonel John Stacpole, C.V.O., A.A.G. for Military Embarkation Duties, had charge from the very beginning of an operation of extraordinary difficulty, involving prodigious labour. It was certainly due to the ready co-operation of the naval and military officers that the success of the operation was largely

due. Everything worked with the utmost smoothness, and in the most satisfactory way that was possible, a remark which applies also to the conduct of the transport work at other ports. Something of the remarkable success at Southampton was doubtless due to the fact that the South Western Railway Company owns the docks, and was able to despatch troops with the utmost regularity and punctuality. On one day, October 20th, 1899, five transports left the port for South Africa, taking 167 officers, 4,756 men, some horses, 38 vehicles, and five guns; but, although this was the busiest day for the railway company and the dock officials, it did not, by any means, overtax the available resources, for double the number could have been dealt with. More than once the South Western Railway Company has received expressions of gratification from the Admiralty and War Office for the excellent work that was done. It deserves to be recorded that the troop traffic on this line from October 30th, 1899, to December 31st, 1900, was as follows: 6,160 officers, 229,097 men, over 23,000 horses, 286 guns, and over 1,000 waggons, all conveyed in 992 special trains, of which 573 were from the London and South Western Company's own system, and this number does not include 162 additional special trains for the transport of horses. These facts are cited as illustrative of the extraordinary extent of transport-work, the success in dealing with which was not, however, confined to the port of Southampton.

Some mishaps.

There were, of course, some mishaps and misadventures, but I do not propose to make a full catalogue of the untoward incidents which occurred during the course of the transport operations, though some facts may be recorded. In October, 1899, the Wardha, with the 9th Lancers on board from Bombay, broke down, and the troops were sent on from Durban to Cape Town in the Nevassa. The shaft of the Persia, with a squadron of the 6th Dragoons on board, broke near St. Vincent in November, and the troops were transferred to the Goth. The Rapidan, leaving Liverpool in the same month, with 494 horses on board, encountered a gale in the Irish Sea, and some of the horse fittings were broken away, with the result that 156 horses were lost, and the ship had to return to port to refit. The experience was valuable, and in later horse transports the fittings were of greater strength. Shortly afterwards, the Ismore, with the 63rd Battery, R.F.A., on board, was wrecked in St. Helena Bay, and the battery reached Durban in the Algeria. In January, 1900, the Denton Grange went ashore at Las Palmas with about 7,000 tons of stores on board, which were sent on to Cape Town in the Yoruba and Fort Salisbury. A somewhat serious incident occurred at Southampton in February, 1900, through a fire in the Simla, which did considerable

damage and caused some delay. There were various lesser mishaps, including damage to the propellers of the Manchester Corporation and the Pinemore, and to the stern of the Montrose as she left the dock at Liverpool, and the Sicilian, with remounts, was in collision at Las Palmas in May, 1900. But these and other episodes were only misfortunes such as are incidental to navigation. They did not mar the very conspicuous success that was achieved, and I shall now turn to the naval transport operations in South Africa.

The naval transport operations at South African ports.

A thoroughly efficient organisation for dealing with the vast work of naval transport had also to be devised at the bases of the military operations in that country, and obviously many of the special conditions which attended the transport of troops, stores, and animals could only be fully revealed on the arrival of the ships at the ports of disembarkation. We cannot attach too much weight to the magnitude of the responsibilities involved, nor speak too highly of the great services rendered by Captain Sir Edward Chichester, as Principal Naval Transport Officer, and his staff in South Africa. An enormous amount of work devolved upon these officers, which demanded both organising discernment and administrative capacity, and it was conducted in a manner which reflects the highest credit upon the naval service, and of which the country may well be proud. It must be remembered that in addition to the huge business connected with the arrival, berthing, coaling, and departure of the various transports from England, India, and elsewhere, transport vessels were in constant demand for a vast amount of work of which very little is known. They were used to convey native carriers from Chinde round to Cape Coast Castle; the Australian contingents from Australia to Beira and Cape Colony; and the Boer prisoners to Ceylon and St. Helena; and later on they were detached to transport troops to China. They ran the mail service between Lourenço Marques to Beira, and conveyed naval details from Simon's Bay to coast ports, and troops to Walfisch Bay, and relieved them from time to time. They were also requisitioned to convey undesirables, ordered out of the country by the Field-Marshal Commanding-in-Chief, from coast ports to England and Flushing, as well as to return native carriers to India, besides much other service of a like character. A few transports were moreover often used for the reception of Boer prisoners and Boer sick, these being invariably anchored in Simon's Bay under the eye of the naval authorities there.

Transport staff.

It is only right to link with the name of Sir Edward Chichester in this great work of dealing with the transport in South Africa, although it is impossible to do justice to all who were concerned in the operations, the names of his executive officer, Lieutenant S. A.

Perry-Ayscough, R.N., his coaling officer, Lieutenant A. Lingham, R.N., (retired) and his secretary, Mr. W. Beresford Whyte, R.N.

The naval transport staff in South Africa consisted of the following:—

Cape Town.	Port Elizabeth.	East London.	Durban.
1 Captain P.T.O. 1 Lieutenant. 1 Lieutenant (retired) for coaling duties. 1 Secretary. 1 Boatswain. 2 Chief Writers. 2 Signalmen.	1 Captain. 1 Commander (retired).	1 Commander (retired). 1 Boatswain.	1 Captain (retired.) 1 Commander R.I.M. 1 Chief Boatswain. 1 Carpenter. 1 Lieutenant R.I.M. 1 Writer.

The Indian Marine officers employed at Durban came over with the first of the troops from India.

The military embarkation staff at Cape Town consisted of a Deputy Assistant Adjutant-General for Embarkation Duties, and certain other officers known as embarking staff officers, and to each ship that landed troops one of these was told off, and was responsible for the receipt of all papers and returns, and for the disposal of all troops, stores, etc., on shore. At the commencement of the war, the military work was done by a lieutenant-colonel and three or four officers of the Army Service Corps, but, owing to pressure of work, Major Lascelles, Deputy Assistant Adjutant-General for Embarkation, and four subordinates undertook the duties, and after a time, when the military officers had gained experience in the nautical work, it became unnecessary for the naval executive officer to board every ship immediately on arrival.

Arrival of transports.

Three or four ships might arrive on the same day, and were anchored in Table Bay, while the military officers got their exact details, told off the troops which were to be first landed in order that these might get up their baggage, and gave the commanding officers of the troops a general outline of what was expected of them when the ships were berthed. Meanwhile the general officer commanding the lines of communication at Cape Town had been informed of the arrival of the ships, and on several occasions had to telegraph to the Commander-in-chief for instructions as to whether the troops should be disembarked at Cape Town or be sent on to Port Elizabeth, East London, or Durban. As soon as an answer was received, the Principal Naval Transport Officer was informed through the Deputy Assistant Adjutant-General for Embarkation, and the coast-bound ships (if any) were immediately ordered on by the former, while the

ships required at Cape Town Docks were berthed. All movements of ships coming into and going out of dock were ordered by the Principal Naval Transport Officer, who would telephone to the Port Captain precise instructions as to the berths to be taken up by the arriving ships—a matter which required considerable discretion. The Port Captain would then give directions to the several pilots, an excellent set of men, to carry out these directions. Sometimes a ship would arrive from England with insufficient coal to take her on to Durban, at which port her troops might be required. A berth would then be found for her, and she would be at once brought in to be completed with as much coal as would enable her to proceed with safety. These cases were, of course, most irritating to the officers and troops on board, who were eager to go to the front, and orders were therefore given that all ships coaling at St. Vincent should, if possible, complete for Durban, but in some cases this was impossible. When a regiment disembarked, it was sometimes entrained at once, or, if trucks were not available, it was sent to Green Point Camp or elsewhere until the rolling stock was ready.

Naval and military co-operation.

Preparatory to landing troops, stores, or animals, the Naval Executive Officer would often accompany the Military Staff Officer to give orders to the captain of the transport as to getting derricks rigged and hatches uncovered. He would inform the military authorities as to how many fatigue parties would be required, and where, but the actual ordering of the men to pass out rifles or parade on the wharf was always executed by the military officers, while the stevedores, under the orders of the naval authorities, hoisted out the stores, guns, waggons, or whatever might be to discharge from the ship. After a little experience the limits of the naval and military authorities were perfectly understood, and the naval officers, who were responsible, were well supported by their military coadjutors. The best feeling existed between them, and this was the secret of the smooth working of all the transport at Cape Town. The disembarkation of horses and mules was carried out under naval control, but the men for taking the horses out of the ships and leading them away were supplied by the Remount Depôts, working under officers of the Army Service Corps, who carried out the plan of disembarkation arranged by the naval authorities, whose authority and responsibility were fully recognised.

Requisitions for passages and freight.

In regard to requisitions for passages and freight, which latter came mainly from the Ordnance and Supply Departments, a special system was instituted. In the early part of the war, when demands were urgent, requisitions were accepted from the departments concerned, but afterwards the Principal Naval Transport Officer

declined to receive requisitions, except through the Deputy Assistant Adjutant-General for Embarkation, who thus became the medium between the naval authorities and the various military departments. This was an excellent system, because that officer was in touch with the General Officer Commanding Lines of Communications, and was usually informed as to the position of affairs at the front, and thus able to co-ordinate the work of the various departments, which might otherwise have been apt to consider only their immediate interests, and much expense appears to have been avoided in consequence. It follows from the nature of military operations that requirements may vary from day to day, and that, for example, ammunition may be running short in some particular theatre of the war, while the provision of forage may also demand great forethought. As an instance of what occurred before this direct channel for issuing orders had been instituted, the following example was cited: A ship might arrive with provisions, and being required at another port, the Director of Supplies would request the Principal Naval Transport Officer to send her on, which he would do, but after her departure it might be discovered that she had also on board large quantities of ordnance stores urgently required at the first port of arrival.

Causes leading to delay in disembarkation.

Allusion has been made above to the delay in the landing of stores. This chiefly occurred in the case of horse ships, which carried enormous quantities of stores, and always had forage for fifteen days besides a surplus stock for the voyage out. The result was that, in nearly all cases, before the troops, horses, guns, etc., had been landed, the berth was required for another transport, and ships would have to wait out in the bay until a favourable opportunity occurred of discharging the forage or other stores they had brought. At one time there were over twenty transports in Table Bay, all empty except for forage. Much of this delay was due to the inability to receive the cargoes owing to the want of stocking space and the scarcity of rolling stock for despatching forage up country. As opportunities offered, the enormous cargoes were discharged and the ships sent back to England and India respectively, but it was pointed out that if these ships had brought only troops, horses, and the necessary impedimenta, this delay, which was over three months in many cases, would never have occurred.

Defective stowage.

Delay was also caused in several ships by only two hatches being used for the enormous quantities of stores and forage, and in some cases there was mismanagement which recalled Crimean days. Rarely in transports, but very often in freight ships, the stores for the troops were placed at the bottom of the hold, while private cargo, in the latter class of ships, and hay, etc., in the case of some

transports, was put on the top. In many ships conveying artillery the guns and vehicles had their wheels taken off, the wheels being put in first, and the heavily packed limbers and guns on the top, and, in a number of cases where ammunition columns and batteries came together, there appeared to be no separation, and the method of stowage left very much to be desired. This is a matter that deserves to be dwelt upon. Chaos and delay to a damaging extent were caused by want of forethought, and the wharf at Cape Town was sometimes lumbered with heavy vehicles, guns and limbers, all unable to be moved, except by great exertion, because their wheels were at the bottom of the hold.

As a contrast to this confused state of things, it may be mentioned that, in the case of one ship, a battery was very urgently required, and within five hours of coming alongside the wharf the officers, men, horses, guns and vehicles were all in the train. The reason was that every wheeled conveyance had been put into the ship just as it arrived at the port of departure, and just as it was taken out at Cape Town. Another example of fine work was the embarkation of a complete battery of artillery in the space of two hours. On the other hand, an unfortunate case of mismanagement was that of the Umbria, which brought out four battalions of Militia, of which two were landed at Cape Town and the others at Port Elizabeth and East London, but, in order to get at the camp equipment for the battalions landed at the first-named port, everything had to be taken out of the ship, sorted on the wharf, and the rest put back again; and this was not an isolated case. In many of the horse ships, in which horses had to be walked from one deck to another in order to land them, the hatches in which the horse-brows had been erected had been filled with stores, etc., to be landed with the troops, which made it necessary to unrig the brows to get at the stores and to rig them up again to take out the horses. In some cases the horse-brows had been taken down altogether, and in one or two cases had been left behind in England, thus entailing unnecessary delay and labour at Cape Town. Durban was in a better situation for disembarking stores, etc., because of possessing cranes, but at the other ports derricks were absolutely necessary.

Insufficient tackle and means for disembarkation.

Many of the transports arrived without necessary tackle and appliances for working out their own cargo, and additional work was thus thrown on the people at the port of disembarkation. The facilities for discharging lighters at Cape Town were very limited, and happily it was not often necessary to resort to that method, but, when a great number of ships were waiting to discharge, the inability to work with lighters was a serious cause of delay. Later on the

Harbour Board provided a greater number of lighters, with additional cranes, and undoubtedly the port of Cape Town gained much experience during the war, and improvements are likely to be made.

The labour for stevedoring and discharging stores from transports was provided by contractors, but was at first most unsatisfactory, the men, mostly West Indian and American blacks, being very independent, making it extremely difficult to get labour on Saturday afternoons, or on Sundays at all. The difficulty was got over by offering greater wages, but, as the men got accustomed to regular work, and picked labourers were distributed among them, the conditions greatly improved. The real need, however, was for a party of bluejackets, who would have done the work in half the time. It was impossible to impress upon the natives how much depended on getting the ships cleared and the troops away up country with despatch.

Provision of labour.

Generally speaking, the horses and mules arrived in good order, but serious illness broke out in some cases, and ran up the total of deaths considerably. The Atlantic cattle ships gave excellent results, and their officers were quite at home with the horses. At Cape Town the animals were almost invariably walked ashore, the saving of time and labour being enormous. The horse-brows which were found most useful were of light construction, about 24 feet long by 4 feet wide, and with sides about 4 feet high, and were fitted on a pair of small wheels balanced in the middle, but other horse-brows were provided for the requirements of different sizes of ships. The big cattle ports as fitted in the cattle ships were quite the handiest for getting horses out. The horse fittings of the Armenian were much approved, these being a good example of the system of sacrificing a gangway in rear of the stalls to a little extra room in front, thus affording greater facilities for cleansing and far better drainage. It was pointed out, however, that in this ship, which was fitted for 750 men, there was an elaborately fitted saddle-room at the foremost end of the troop deck which would have accommodated 150 men, but was never used. One of the best horse ships that reached Cape Town was the British Princess, which had wide roomy decks, with gangways behind the stalls and also in front, with a perfect system of drainage.

Horse transport and disembarking horses.

As soon as the outward bound transports were clear of troops and stores, they were at once coaled (if infantry ships), filled up with invalids, and despatched home, and, when the numbers of enteric and wounded increased, the best of the horse ships were employed in this service, and were useful in clearing the base hospitals and making room for bad cases from the front. The prompt coaling of the transports was at times very difficult, owing to the scarcity of

Coaling transports.

native labour, which has been alluded to, and the shifting of coal from ships' holds to bunkers was often performed by the ships' crews, who got paid for this work.

The Junior Lord of the Admiralty was responsible for the supply of coal, and he was constantly kept informed by the Principal Naval Transport Officer as to the requirements for the same.* In the early part of the war some six colliers, containing between 3,000 and 4,000 tons of coal each, used to arrive at Cape Town monthly. When the rush of troops was fairly over, this number was reduced, and about the middle of 1900 the Natal Coal Company supplied the Durban transports from their colliery at thirty shillings per ton, thus effecting a great saving in the coal bill. This Natal coal was very fair, and, in fact, a shade better perhaps than our English north country coal. Some of the larger transports, notably the Cunarders, were large coal consumers, and used to arrive at Cape Town with not too much coal to spare. This was accounted for by the fact that these ships were built for the New York trade, a 3,000 miles run, and the run from St. Vincent to Cape Town, about 4,000 miles, was never anticipated when their bunker space was designed.

There were, at Table Bay harbour and docks, only four docks in which transports could be coaled in dock, though on a few occasions of emergency vessels berthed alongside the south arm were coaled from a collier on the outside, but no coaling from the jetty side was possible, owing to the whole space being required for the disembarkation of troops, horses and stores, and also to the fact that the Government coal stack on the north arm was at a distance of over a mile. During the early part of the operations a few transports were coaled in Table Bay from colliers taken alongside, but the contractors did not like the expense of sending labourers out, and the work could only take place in fine weather and in smooth water. A complaint was made at the beginning of the war that some of the coal-bags used by the contractors were very defective. The Kildonan Castle, transport No. 44, was one of the very best class of ships for all-round coaling that was dealt with at Cape Town, and the Orient, No. 24, was another very good type. The experience gained justified the conclusion that, when transports are required in time of war, they should be selected, as far as may be possible, with a view to their facilities for all-round coaling, and should be required to carry their shoots in all cases where they take coal in through the ships' sides.

Colliers. Up to the beginning of October, 1900, fifty colliers, with an output

* The coaling of transports was afterwards in the hands of the Transport Department of the Admiralty.

of about 161,000 tons, had been discharged at Cape Town, and the Floriston was pronounced to be the best type for discharging into every kind of transport. She had an average cargo of 3,200 tons, and her deck was flush fore and aft, thus enabling coal to be carried the whole length of the ship; there were two derricks with separate winches over two holds, and the rails round the sides were nearly all removable, which enabled coal to be carried across gangways, whereas in a collier with permanent bulwarks, it is obvious that, when she rises and the transport gets low in the water, the facilities for discharging coal down shoots through narrow doors, or over the transport's rails, are reduced sooner than when there are no bulwarks at all. The advantage of having two derricks with separate winches for each hold, or for at least two holds with large hatchways and no 'tween decks, of ballast tanks, of exhaust steam pipes which do not interfere with the work, of holds without wooden partitions, and of wire runners and swivel hooks, seem to be indicated by the experience at Cape Town. In the "collier's outfit" of many of the colliers which reached Cape Town were included 200 coal sacks, each to hold 2 cwt., but the sacks were too heavy for any ordinary man to carry when full, and the natives at Cape Town refused the work altogether. These sacks were excellent when derricks were used, and when they could be wheeled on trucks, but for man-handling they should have been smaller.

From November 8, 1899, when the first transport was coaled at Cape Town, up to October 5, 1900, 102 transports, etc., had been coaled at the port, many of them several times, thus giving 234 separate coaling operations, while 50 colliers had discharged 164,959 tons, including 80,785 tons of Welsh, 79,076 of North Country, 4,997 of patent fuel, and 101 of coke. It was found that the dealing with briquettes involved considerable labour, since each one of them had to be handled from five to seven times.

At Durban.

Finally I may give some details of the work connected with the disembarkation of troops, animals, and stores, at Durban and other ports, directed by Captain E. B. Van Koughnet, R.N. (retired), as Divisional Transport Officer, assisted by Commander John Martin, R.N. (retired). At the outset difficulties were anticipated in getting the transports inside the harbour, but these were overcome. Troops to the number of over 100,000 were disembarked and re-embarked, with over 500,000 tons of stores, and nearly 40,000 cattle, mules, and horses. The railway company moved them up to the front according to the directions of the military authorities as rapidly as possible. The following are some details:—Landed from October, 1899, to September, 1900: officers and men, 75,359; horses, 21,150; mules,

9,558; tons of stores, 350,529; tons of coal, 70,403. Re-shipped: officers and men, 31,018; horses and mules, 3,439; tons of stores, 12,000. Durban was also instrumental in providing hospital ships. The first of these, the Lismore Castle, was ordered at very short notice, and within four and a half days the vessel was selected, fitted up, and had received her first batch of patients. It was a marvellous piece of work to be done at a port 7,000 miles from England. The other hospital ships were the Nubia, Dunera, Avoca, Simla, and Orkana. To Port Elizabeth Commander F. St. Leger Luscombe, R.N., and to East London Commander Thomas Hadley, R.N. (retired), were appointed as chief naval transport officers.

John Leyland.

CHAPTER X.

The Operations of our Naval Forces on Shore, 1899–1901.

Static and dynamic influence of the Navy.

It has been described as a characteristic of the reign of Queen Victoria that her Navy was never called upon to perform its function of defence upon its proper element; but, on the contrary, that there was hardly an occasion when the Army had been employed that it had not had the assistance of a naval brigade on shore. The statement is true with some qualification, for, although there have not been for many years engagements at sea in which our fleets have participated, on the other hand, the "noiseless" influence exercised by the Navy has been markedly effective at frequent intervals during the late reign. This was the case during the war with Russia in 1854–55; it is apparent to any student of history in many of those crises when war has threatened, but it has never been more obvious than during the recent struggle in South Africa. No better illustration, indeed, of the true significance of sea power can be desired than that afforded by the circumstances presented to us during the past year. That this fact is recognised on the Continent we have demonstrated by the speech of General Radzenhöfer, as well as in a more practical manner by the circumstance that such talk of interference as there has been remained mere talk, and did not assume concrete shape. Once more sea power has gained its purpose without the fighting of a battle or the discharge of a gun. Once again we have demonstrated the truth of Captain Mahan's dictum, that "the successes of the Army can be gained only as the result of the earlier victories of the Fleet, be these victories 'noiseless' or static, as in the case of the Crimea, or be they active and dynamic, as in the case of the victories of Nelson." Nevertheless, it would be altogether a contradiction of history if we had found that the Navy could rest content with playing this important but passive part in any struggle; both in South Africa and in China bluejackets and marines have been landed, the guns of the Fleet have been used, and the Navy has added fresh laurels to that garland of renown which is its birthright. In the following pages I have attempted to sketch succinctly and

concisely the operations and movements in which the Navy has taken part during these campaigns.

The Navy in South Africa.

Naval Brigades in South Africa.

It is unnecessary here to describe at length either the manner in which Great Britain and the Boer Republics came to actual blows, or the strategical situation which was created in October 1899. It will satisfy all the requirements of this brief sketch if I recall the fact that, on October 9, the Boers issued an "ultimatum" to this country, calling upon us to withdraw our troops from certain positions or take the consequences. Forty-eight hours later a state of war automatically came into existence, and on October 20 the battle of Dundee took place. On the same day Rear-Admiral Sir Robert Harris had decided to land a naval force at the Cape, where, in view of the offensive operations around Mafeking and Kimberley, it was apprehended that the enemy might cross the Orange River. A detachment of guns, with bluejackets and marines, under Commander A. P. Ethelston, of the Powerful, was landed and despatched by train to Stormberg, where it encamped. This force was apparently intended to hold the line of railway which is in direct connection with Cape Town, Port Elizabeth, and East London, and connects the De Aar-Naauwpoort line with the Orange Free State.

In the meantime the Terrible and Powerful, two of the largest cruisers in the Navy, had arrived in South African waters to reinforce the squadron there. The Powerful—Captain the Hon. Hedworth Lambton—was on her way home from the China Station when she was intercepted at Singapore by a cablegram, and ordered to proceed, *viâ* Mauritius, to the Cape. The run to Mauritius was made in nine days, at an average of 370 miles a day. There a half-battalion of the King's Own Yorkshire Light Infantry was embarked and conveyed to Cape Town, where the Powerful was able to make a contribution to the landing party mentioned above. The Terrible—

Captain Scott's Guns.

Captain Percy Scott—had already arrived from England on October 14, and her captain, with marvellous intuition, had divined that the most pressing want of the moment would be long-range field-guns. He set to work, therefore, to invent a travelling carriage for the long 12-pounders, which were mounted in the cruisers as broadside guns. His first design consisted of a log of wood to form a trail, mounted on an axle-tree, with a pair of ordinary Cape waggon wheels. On this was placed the ship carriage, bolted down and secured in such a manner as not to interfere with its being put back on board, should circumstances have required it. Two guns thus mounted were landed with the party under Commander Ethelston.

The next step in the naval history of the war was brought about by the situation in Natal. The British troops, after fighting the battles of Elandslaagte and Rietfontein to cover the retirement of the force at Glencoe, had concentrated at Ladysmith, where the Boers threatened their communications. On October 25, General Sir George White, finding that he had no artillery capable of keeping the Boer guns in check, telegraphed to know if it were possible for the Navy to send him some long range guns. Sir Robert Harris at once asked Captain Scott if he could design a mounting for a 4·7-in. gun and get two finished by the following afternoon. The Powerful was selected to take the guns to Durban; by the time stated the two guns, with their mountings and ammunition, were shipped from the arsenal at Simonstown; and at ten the same evening the ship started with them for Natal. The mountings for the 4·7-in. consisted of four pieces of timber, 14 ft. long by 12 in., placed in the form of a cross. On the centre of this was placed the ordinary ship mounting, bolted through to a plate underneath. The pedestal and timbers were thus all securely bolted together. Next the gun carriage was dropped over the spindle, and secured down by its clip plate. Subsequent experiments with a platform of this description showed that it was not even necessary to fill in round the timbers with earth; on firing, a slight jump of the platform, of course, took place, but this in itself was advantageous as it relieved the strain. At 9 A.M. on Sunday, October 29, the Powerful arrived at Durban, having made the voyage at the rate of 380 miles a day. During the few days at sea the mountings for the 4·7-in. guns were packed in strong cases ready for immediate landing, and field carriages on Scott's pattern were constructed for the 12-pounders. Every preparation, too, was made for disembarking a naval brigade. Immediately on arrival the landing took place, and the same evening the brigade in two trains was *en route* for Ladysmith. The force consisted of seventeen officers and 267 men. The battery comprised the guns' crews, a gun mounting party, stretcher bearers and ammunition carriers, cooks, servants, and sick berth attendants, with three armourers, a blacksmith, and a carpenter. The guns which they took with them were two 4·7-in. quick-firers, to be mounted on the wooden platform, three 12 cwt. 12-pounders on Scott's carriages, one 8 cwt. 12-pounder on naval field mounting, and four maxims, three mounted on field carriages and one on a tripod. The ammunition consisted, for the 4·7-in., of 200 rounds of common shell, 200 rounds of lyddite shell, 200 rounds of shrapnel shell. For the 12-pounders, 738 rounds of common shell, 396 rounds of shrapnel, and 24 case shot. In addition to the 150 rounds of Lee-Metford ammunition carried by each man, 39,000 rounds were taken, with 64,000 rounds for the

The Powerful's Column.

maxims, and 5,400 rounds for the revolvers. The journey was made without any unusual incident until within sight of Ladysmith station, when the train was greeted with several shells from a Boer 6-in. gun, the Long Tom of Pepworth Hill. The battle of Lombard's Kop or Farquhar's Farm was actually in progress, the advance of our troops having been checked, and indeed, a retirement was taking place. The Naval Brigade, therefore, was at once detrained and three 12-pounders were despatched to the scene of action. Each gun was secured by the trail to a waggon drawn by sixteen oxen, and thus advanced for two miles to a position from which they could engage the Boers. As soon as they got into the open the guns came under a heavy fire, one being overturned by a bursting shell and three of the bluejackets wounded. The remaining 12-pounders unlimbered and got into action, opening such an accurate fire that at the third shot the enemy's gun was knocked over and ceased to reply. With the silencing of this gun the enemy's attack ceased and the British force was enabled to return to camp without further fighting. To Mr. W. Sims, the gunner of the Powerful, who has since been promoted to commissioned rank, belongs the honour of laying and sighting the gun which made such splendid practice, the range being between 6,500 and 7,000 yards. In regard to this exploit, Sir George White says in his despatches, "Captain the Hon. Hedworth Lambton, commanding the Naval Brigade, reached Ladysmith in the nick of time, when it became evident that I was not strong enough to meet the enemy in the open field. He brought with him two 4·7-in. and four 12-pounder guns, which proved to be the only ordnance in my possession capable of equalling in range the enemy's heavy guns. Although the ammunition available was very limited, Captain Lambton so economised it that it lasted out to the end of the siege, and under his direction the naval guns succeeded in keeping at a distance the enemy's siege guns, a service which was of the utmost importance." The same night (Monday, October 31) an attempt was made to get one of the 4·7-in. guns to a position in which it was proposed to mount it, but owing to one of the waggons sticking in a donga the attempt was unsuccessful. The three long 12-pounders, the field piece, and the four maxims were, however, placed on the top of Gordon Hill in the centre of the northern line of defence, and later on the two 4·7-in. guns were mounted, one on Junction Hill, at the foot of which the railway lines join one another, and the other on Cove Redoubt, about a mile to the north-west of the town. This last gun remained in this position during the whole of the siege, but the others were moved several times during its progress. It is beyond the scope of this article to describe the events of the siege, but it should be mentioned that the Navy

The Ladysmith siege.

took part in the defence of Waggon Hill when, on January 6, the enemy made a determined but fortunately unsuccessful attempt to carry Ladysmith by storm. Two naval guns were in process of transfer to the hill during the previous night. These guns were accompanied by naval detachments and a working party of Royal Engineers and Gordon Highlanders, and were consequently on the hill when the attack commenced in the morning. The bluejackets with their military comrades clung to their positions on the extreme south-west point of the hill and held the Boers in check till daylight. Gunner Sims was in charge of this party of seamen and their gallant service has been testified to by all who were present. To contribute to the water supply, condensers were constructed out of improvised materials under the direction of Engineer Sheen of the Powerful and proved most valuable. Of the general conduct of the brigade Sir George White says in his despatch that "they rivalled the best of our troops in gallantry and endurance, and their long-range guns, though hampered by a most serious want of sufficient ammunition, have played a most prominent part in the defence, and have been most successful in keeping the enemy from bringing his guns to ranges at which they would have been most efficient. On February 29, when Ladysmith was relieved, the Powerfuls returned to their ship, and that vessel returned to England. On her arrival at home in April, Captain Lambton and the officers and men who had served during the siege of Ladysmith were entertained at Portsmouth, and were afterwards ordered to Windsor, where they were inspected and thanked for their services by Queen Victoria. On May 7, the brigade marched through London to be inspected by the Admiralty on the Horse Guards Parade. The streets were decorated and the public seized the opportunity to give the bluejackets and marines an enthusiastic reception. The King, then the Prince of Wales, attended by Viscount, then Mr., Goschen, the First Lord of the Admiralty, addressed the brigade.

Reception of the Powerful's contingent in England.

Defence of Durban.

To return to the situation in Natal. With the field force shut up in Ladysmith and the Boers overrunning the country, Sir Walter Hely Hutchinson, the Governor, applied to the Admiral for a force to undertake the defence of Durban. The Terrible was despatched for this purpose and arrived on November 6, 1899. By the following day Captain Percy Scott had surveyed the position, and by the 8th had completed his arrangements for defence. Thirty guns in all were so mounted as to command all the approaches as well as the waterworks and other important positions. The guns were two 4·7-in., sixteen 12 cwt. 12-pounders, two 8 cwt. 12-pounders, one 9-pounder, one 7-pounder, two 3-pounders, two Nordenfelts, and four Maxims. Captain Scott was appointed Commandant of the town,

with a staff of naval and military officers to assist him; the local rifle associations volunteered for service, with a corps of mounted scouts. The ship herself was utilised in the scheme of defence and an armoured train patrolled the railway in the neighbourhood of the town. Such an event as a naval officer becoming commandant of a large town under martial law and organising its defence from naval sources is probably unique. As it turned out, the matter was never put to the test, but there can be no doubt that had the enemy appeared they would have met with a warm reception.

Natal Field Force.

By the end of November the Ladysmith relief column was ready to begin an advance, and a Naval Brigade under Captain E. P. Jones, of the Forte, and Commander A. H. Limpus, of the Terrible, with two 4·7-in. guns and eighteen long 12-pounders, were ordered to accompany it. These 4·7-in. guns were on a different pattern of mounting from those sent to Ladysmith, improvements having been made by Captain Scott in his design. A double trail was used to allow of great elevation, and iron wheels were supplied. A heavy axle-tree was used, on which the double trail was secured and the carriage put on it. Telescope sights were fitted to these guns. They were easily drawn by a span of oxen, and were found to be sufficiently mobile to accompany the columns on the march.

The guns were taken to Chieveley, opposite the Boer position at Colenso, on the northern bank of the Tugela, and from a position called Shooters Hill opened fire at from 5,000 to 9,000 yards, making very good practice at the enemy. The whole of the brigade took part on December 15 in the battle of Colenso, the two 4·7-in. guns and four 12-pounders being in the above-named position, from which they shelled the enemy with lyddite and silenced several guns. Six 12-pounders, under Lieutenant F. C. A. Ogilvy, with Lieutenant H.W. James, of the Tartar, and Lieutenant A. Deas, of the Philomel, were attached to the field artillery under Colonel Long. The two other 12-pounders, under Lieutenant Burne, remained in reserve. The general plan of the advance, had been for two columns to advance and cross the river covered by the fire of the long-range naval guns and supported by Colonel Long's artillery. The first shot of the day was fired at 5.20 A.M. without any reply from the Boers. The field artillery and the naval 12-pounders had then advanced to within about 1,200 yards of Fort Wyllie, when a tremendous rifle fire was opened on them from rifle pits along the river banks as well as from the rising ground on the north side of the river. Nearly all the native drivers of the naval gun teams immediately bolted, but four of the guns were able to come into action. The two centre guns, under Mr. J. Wright, the gunner of the Terrible, were unfortunately

jammed with their ammunition waggons in a drift they were crossing at the time. Eventually even these guns were extricated and brought into action. After half an hour's firing, however, the Royal Artillery guns were silenced and a gallant attempt to withdraw them failed. The naval guns were then ordered back and were dragged away by teams of artillery horses. Lieutenant Ogilvy speaks most highly of the officers above mentioned, and also refers favourably to the conduct of Midshipmen H. S. W. Boldero and G. L. Hodson and Mr. W. T. Hollins, clerk. With regard to the 4·7-in. guns under Captain E. P. Jones, Commander Limpus says: "There was too much for us to cope with; there was Fort Wyllie to shut up and the infernal triple row of schantzes and shelters along the neighbouring kopjes, and we wanted more long-range guns. As soon as the General realised that he had practically lost the services of the guns under Colonel Long altogether, and considering the non-success of his left attack, he ordered a general retirement to camp. This was at about 11 A.M." The naval guns, however, did not retire until every one else had gone back, as they covered the retirement, and it was nearly half-past two when they reached the camp. Two days later the 4·7-in. battery and six of the 12-pounders were moved forward again to Gun Hill, where they remained until the second week in January, and during that time worried the Boers at odd hours during the day and night. It was during this bombardment that William Bate, the captain of one of the 4·7-in. guns, cut the Colenso road bridge at 7,500 yards, putting a lyddite shell through the span close up against one of the piers, so that one end of the span dropped into the river and the bridge was useless. The naval guns were next moved to Mount Alice, a plateau near Spearman's Camp about one thousand feet above the river level, commanding a magnificent view of the Tugela Valley and of Ladysmith, where the entrenchments at Cæsar's Camp were plainly visible. The work of moving the guns to this position was exceedingly arduous. Commander Limpus, in his diary, relates:

Battle of Colenso.

"If a waggon dared leave the road and tried to push on across the tempting-looking green veldt, down sank the wheels to their axle-trees and it had to be extricated. We with the guns, tried it, and so we knew. But we were fortunate in having drag ropes and men to use them, and so soon got out, and, indeed, were able sometimes to give a helping hand to waggons that had not these luxuries. And then the spruits that had been dry were now rushing torrents, which had to be bridged or else crossed exactly at the right place, and the flatter ground near them had become either a lake or a swamp. In the exits from these drifts the oxen sometimes sank the whole length of their legs, and the waggons up to the axles, and one had to put in an

extra team so that the beasts at the end, on comparatively hard ground, might pull the others along. . . . Captain Scott has said that the 4·7-in. guns were mobile. They certainly were. For even under these trying circumstances we never delayed anybody else or found any difficulty in keeping our place or time. My orders, when starting for the front, were that the guns could go anywhere, but we were never driven to extreme measures. If necessary, of course, the guns could have been dismounted, packed round with wood, and hooped together like a cask, and then rolled up any place one can think of with ropes. On ordinary ground their rate of travel was practically that of the infantry. Our longest march was eighteen miles in six hours, and during that time we had two or three halts in order to give our infantry escort a spell. In fact, the guns were, even on their improvised mountings, as mobile as was necessary for all their purposes."

Vaal Krantz.

The guns of the Naval Brigade played their part from Mount Alice, and other positions to which they were moved, in all the fighting which took place from about the middle of January, and including, of course, the fighting round Spion Kop and the capture and evacuation of Vaal Krantz, until February 8, when the force moved back again to the neighbourhood of Chieveley.

While the main body of the relief force had been thus operating the General left in command at Chieveley had applied to Captain Percy Scott for a 4·7-in. mounted on a railway truck. One of the platform mountings, similar to those sent to Ladysmith, was placed on a low truck and secured by means of chains. This gun could be fired at right angles to the direction of the railway line, and was used to shell a new position which had been made by the Boers. Three more 4·7-in. guns on platforms were also sent to the front, and for the final attack Sir Redvers Buller wired to Captain Scott asking if he could have a 6-in. gun on a field mounting. A gun was taken out of the Terrible, a design prepared, and a mounting made in less than four days. It arrived at the front in time and threw upwards of 500 lyddite and common shell into the enemy's position. The General, in his despatch to Lord Roberts, mentions this reinforcement of heavy guns. "One naval 6-in. mounted on travelling carriage by Captain Scott, R.N., and two naval 4·7-in. mounted on platform carriages." In the attack he refers to these naval guns, which, under Captain Jones, R.N., "rendered the greatest possible service." And

Relief of Ladysmith.

again, in the concluding battle at Pieters Hill and Terrace Hill, Sir Redvers Buller says: "The fire of the naval guns here was particularly valuable, their shooting was admirable, and they were able to keep up fire with common shell long after the Royal Field

Artillery were obliged to cease their shrapnel. Indeed, Lieutenant Ogilvy, of the Terrible, kept up fire on the largest sangars till the infantry were within fifteen yards of them. His guns must have saved us many casualties." In another despatch the General says: "Captain E. P. Jones, of the Forte, as senior officer of the Naval Brigade, has earned my most heartfelt thanks. The assistance the brigade have rendered to me has been invaluable, the spirit of their leader was reflected in the men, and at any time, day or night, they were always ready, and their work was excellent. Commander A. H. Limpus and Lieutenant F. C. A. Ogilvy and Lieutenant H. W. James were indefatigable. There never was a moment in the day that they were not working hard and well to advance the work in hand. Lieutenant N. W. Chiazzari, Natal Naval Volunteers, was in charge of a detachment who were associated with the Naval Brigade and took their full share of the good work done by it."

Later operations in Natal.

After the relief of Ladysmith the greater part of the two brigades, with their guns, returned to their ships, a small column, belonging to the Forte, Philomel and Tartar, with two 4·7-in. and four 12-pounders on travelling carriages, alone continuing with General Buller in his advance to the frontiers of Natal. Two smaller naval forces were employed in Natal. A few men of the Forte and Philomel were in the armoured train disaster at Estcourt, where they worked a machine-gun on the train and were taken prisoners by the Boers. Two of the Terrible's 12-pounders accompanied a small force which was sent to Eshowe, in Zululand, to stop any Boer incursions in that neighbourhood.

The bluejackets were utilised in many other ways than with their guns. Nine of the Philomels and Fortes worked with the balloon, and the officer in command reported that their services were invaluable. A party of the Terribles worked with Captain Percy Scott's searchlight, and others fitted out an armoured train for the Royal Engineers, covering the whole with double part of 6-in. hawsers, worked like the rope traverses used between unprotected guns on board ship. They also assisted in working the pontoons, and General Lyttelton, at Potgieters, sent a message to Captain Jones to say they had been to him "worth their weight in gold."

The small force referred to above accompanied the troops over difficult country to Volksrust, where it arrived on June 13. A summary of the operations is drawn from the despatches of Captain Jones. On April 10 the Boers opened fire on the camp at Sundays River, and the naval guns were immediately brought into action, eliciting commendation from General Clery for their smartness and the way in which they kept the enemy's fire down. General Clery requested

that his letter might be read to the men, and Captain Jones remarks that it was the first time any of them, except the Tartar's, had been under fire, and they acquitted themselves very well. Lieutenant J. M. Steel, of the Forte, was slightly wounded in this action by the fragment of a shell. On May 11 the brigade accompanied the movement which took place through Helpmakaar and the Biggarsberg to Glencoe and Newcastle, a succession of wearisome daily treks, until June 5, when the brigade encamped at De Wet's Farm. Then, attached to General Coke's brigade, it took part in the flank march through Botha's Pass into the Orange Free State, assisting in the flank movement which brought about the evacuation of Laings Nek. On June 14, from Volksrust, Captain Jones wrote: "We have been trekking hard and fighting at intervals for a month without intermission." In another letter he describes how, after fighting all day, about 8 P.M. he received orders that his guns were to be got to the bottom of Van Wyk, a hill near Botha's Pass, during the night. There was a dense fog and it was bitterly cold, but by putting every man on the drag ropes the waggons containing the guns were eased one by one down the hill, a most arduous piece of work, as the men had to climb the hill again after each. They worked splendidly, and everything was got down to the drift at the bottom by 4 A.M. "I consider," says Captain Jones, "that this is the best night's work our men have done during the whole campaign." On June 24, Captain Jones and the officers and men of the Forte returned to their ship. Lieutenant A. Halsey, with two 12-pounders, accompanied the flying column, under General Coke, in the advance to Standerton, where they arrived on August 28. Lieutenant C. R. N. Burne, commanding the Tartar's detachment, and Mr. W. R. Ledgard, midshipman of the Philomel, also remained until this portion of the Naval Brigade was finally withdrawn in October.

Work of the ships.

Although the officers and men who were landed naturally loom largest in the story of the naval participation in the war, the arduous labour that fell upon those who remained on board the ships at sea should not be forgotten. The duties that devolved upon these ships was varied and yet monotonous. They were required to patrol the coast, especially to watch Lourenço Marques, and to arrest such vessels as might attempt to carry on a contraband trade. Some vessels they did actually arrest; but, unfortunately, for political reasons, most of these were released. The fact that this was so should not make less ready public recognition of the zealous work done in this direction. "When everything is taken into consideration," as Captain J. E. Bearcroft said at a banquet given to the Philomel's naval brigade, "the absence of prize money, and the danger

and wear and tear of being always at sea, which they all knew, because they had had to do it, those at the front had, at all times, certainly the best of it." The Philomel herself was, it appears, thirty-four out of thirty-six days at sea, and the odd two days coaling, and this should be a fair specimen of the kind of operations which fell upon those who remained on board the ships, and who, of course, had to work short-handed.

The landing of a brigade at Cape Town, and its despatch to Stormberg, has been already mentioned. When it was decided that Lord Methuen should make an attempt to relieve Kimberley this force was withdrawn through East London, and returned to its ship at Simonstown. There it was reorganised, and when re-landed was commanded by Captain R. S. Prothero, the flag captain to Sir Robert Harris. In the Cape Colony.

The force left Simons Bay on Sunday, November 19, and arrived at Lord Methuen's headquarters at Wittiputs on the 22nd. That afternoon the brigade advanced towards Belmont, and next day took part in the battle called by that name. The guns only participated, and at 1,700 yards made excellent practice until the Boers retreated. On the afternoon of the 24th the brigade moved on, marching at the head of the column to the next bivouac, the guns and ammunition being left in the trains under command of Lieutenant F. W. Dean. That night orders were issued by General Methuen that the Naval Brigade would lead the attack on the following morning on the enemy's position, supported by the Yorkshire Light Infantry, the attacking force being under the command of Brigadier-General Money. The brigade paraded at 3 A.M. on the 25th, and fought the battle which is known both as Graspan and Enslin. The brigade deployed in line, single rank, four paces interval, and advanced on the enemy, Major J. H. Plumbe, R.M.L.I., in command on the left, Commander Ethelston, R.N., in command on the right, and Captain Prothero in the centre. The enemy opened fire at about 600 yards, the brigade advancing with great courage and cool determination by rushes. After losing heavily, both in officers and men, the position was carried by the bluejackets, marines, and Yorkshires. Out of the total of deaths and wounds suffered by the attacking forces in this battle about a third fell on the Naval Brigade. Fifty-seven per cent. of the rank-and-file of the marines were hit and fifteen bluejackets, and of the nine officers killed four belonged to the Naval Brigade. The total number of casualties in the brigade was 105. Commander Ethelston, R.N., Major Plumbe, R.M.L.I., Captain Guy Senior, R.M.A., and Midshipman C. A. E. Huddart were killed; Captain Prothero and Lieutenant W. T. C. Jones, R.M.L.I., were wounded, the last named with a Battle of Graspan.

bullet in his hip while charging to the top of the hill. The Yorkshires lost forty-five killed and wounded. After Commander Ethelston and Major Plumbe had been killed their men were led by Lieutenant the Hon. E. S. H. Boyle and Captain A. E. Marchant, R.M.L.I., respectively, the latter officer taking command of the whole brigade when Captain Prothero was wounded. The officers, petty officers, and non-commissioned officers and men of the brigade behaved, says Captain Marchant in his report, with conspicuous gallantry, and Captain Prothero remarks that, in spite of the murderous fire, the behaviour of officers and men was beyond all praise. In addition to the officers whose names have been already mentioned, reference is specially made to the services of Lieutenant F. J. Saunders, R.M.L.I., Gunner E. E. Lowe, R.N., and Midshipman W. W. Sillem. Lieutenant F. W. Dean, Lieutenant G. W. Campbell, Sub-Lieutenant R. F. White, and Midshipman T. C. Armstrong, who were with the guns, behaved with great gallantry in a very exposed position commanded by the enemy's guns. Lieutenant Dean, referring to the part played by the naval artillery, says: "I continued to fire as briskly as possible at the Boer guns with such effect that we continually put them out of action for as much as fifteen or twenty minutes at a time. Their shells burst with utmost accuracy, and both our guns and ammunition trolley were spattered all over with shrapnel balls; but, owing to my system of making all hands lie down when we saw their guns flash and remaining till the shell burst and the balls flew by, we had only six men wounded when, at 9.30 A.M., the Boers finally ceased and abandoned their position." The invaluable aid rendered to the wounded in the action by Fleet-Surgeon J. Porter and Surgeon C. M. Beadnell is also referred to in the despatches. By direction of her Majesty Queen Victoria the following telegram was sent to the Naval Commander-in-Chief at the Cape of Good Hope: "The Queen desires that you will convey to the Naval Brigade who were present at the action at Graspan her Majesty's congratulations on their gallant conduct, and at the same time express the Queen's regret at the losses sustained by the Brigade."

Comment on the employment of the brigade.

The employment of bluejackets and marines as infantry in this action has been much commented on and criticised. Seeing that Lord Methuen commanded a force of some 8,000 men the use of the Naval Brigade for the purpose is certainly open to question; but, although it has not been so stated officially, it seems probable that, in this instance, the Navy asked for the position of honour, and possibly claimed it as a right. The result was, in any case, most lamentable, except in so far as the opportunity was given to the seamen and marines to prove that under most adverse conditions

they would behave in a manner worthy of the best traditions of the noble service to which they belonged. Henceforward the naval detachments simply acted as gunners. The remnant of the brigade, under the command of Captain Bearcroft, of the Philomel, with Commander S. V. Y. de Horsey, R.N., Captain Morgan, R.M.L.I., and Lieutenant L. O. Wilson, R.M.L.I., accompanied Lord Methuen in his advance, and the guns took part in the battles of the Modder River and Magersfontein. After the last named battle they were almost daily employed in shelling the Boer lines up to the date of the general advance into the Orange Free State.

Lord Roberts, who had been appointed Commander-in-Chief of the Army in South Africa, landed at Cape Town on January 10, 1900, and a few days later applied to the Admiral for two more naval 4·7-in. guns on travelling carriages. The crews for these guns were made up of fifty-nine men from the Doris and Barrosa, under the following officers: Commander W. L. Grant, Doris; Lieutenant J. A. Fergusson, Barrosa; Surgeon T. T. Jeans, Monarch; Gunner J. Cannon, of the same ship; and Midshipmen G. H. Lang and James Menzies, both of the Doris. These guns were originally intended to operate with General French, at Rensburg, and were landed at Port Elizabeth on January 31, 1900, and sent up by train to Naauwpoort for that purpose. They were afterwards ordered to join Captain Bearcroft's Brigade, but throughout the operations formed a complete naval unit by themselves, and were again detached later on, and are generally spoken of in the telegrams from South Africa as "Grant's guns." To these two guns transport was attached consisting of thirteen large waggons, two small ones for water carts, and 280 oxen, with forty-two native drivers and four Colonial conductors. The mountings of the guns were on the Scott principle, but that which belonged to the flagship had a trail made of steel and weighed about five and a half tons, or somewhat lighter than the mountings which had wooden trails. Each gun was drawn muzzle first by a long steel chain attached to the framework of the mounting, the trail being hung to a limber which formed the steering-gear of the gun. Thirty-two oxen were allotted to each gun, sixteen to each waggon, and six to a water-cart. A span of sixteen oxen covers about fifty yards. The distance taken up by a number of guns was thus very great. Much difficulty was experienced with the chains used for trekking, as these, when broken, had to be mended with steel wire. As in Natal, when it was necessary to cross a drift, drag-ropes were hooked to the wheels and the men assisted in getting the guns over. During the march from the Modder onwards soldiers were frequently told off for this work. Grant's guns marched

Later operations in Cape Colony.

into Jacobsdal on February 16, escorted by half a battalion of Royal Canadians, singing "We'll rant and we'll roar, like true British sailors," and other nautical songs.

Advance into the Orange State.

The remainder of the Naval Brigade, which had been for the past three months at Magersfontein, marched into Jacobsdal on February 18, with two 4·7-in. guns and two 12-pounders. These guns were dragged trail first, being fastened to ox-waggons. On the following day the whole brigade, with its six guns and escort of marines, started on the march to Johannesburg. In the endeavour to get up in time to participate in the blockade of Cronje's laager at Paardeberg, the brigade on one occasion, in twenty-two hours, covered twenty-seven miles, probably a record for guns of this size and weight. On their arrival at Paardeberg three of the 4·7-in. and one 12-pounder were sent to the north of the Modder River, where two other 12-pounders had already been placed in position. The remaining guns remained on the south side, and all took part in the bombardment at ranges varying from 1,300 on the south side to 2,500 on the north. In these positions the naval guns remained until the capitulation. Surgeon C. M. Beadnell accompanied the Royal Canadians in the final advance, and was the first doctor to enter the laager and attend to the Boer wounded. The three guns from the north of the river now rejoined the main body, the other two 12-pounders being sent, under Lieutenant Colquhoun, of the Victorian Navy, to Kimberley, for repairs. These two guns had accompanied General Kelly-Kenny in his chase of Cronje, and on one occasion, when it had been found impossible to get them to the top of a kopje in the usual way, the guns were dismounted, lashed to poles, and carried to the top by their crews, with the help of some of the soldiers. Then they opened fire upon their retreating enemy. These two guns rejoined headquarters before the brigade left Paardeberg.

Paardeberg.

Poplar Grove.

The brigade next took part in the battle of Poplar Grove, and on March 10 began its march of seventy miles to Bloemfontein, with the central division, where it arrived without any particular incident. By some mistake it missed the promised honour of taking part in the entry into the capital of the Orange Free State, but a few days later, on March 21, was inspected by the Field-Marshal, who thanked the seamen and marines for their services, and wished good-bye to those officers and men who had been ordered to rejoin their ship, the Powerful. It was at Bloemfontein that the brigade was fully clothed in khaki serge and felt hats of the same pattern as worn by the Army, the only difference being that on the turned-up brims of the hats the bluejackets wore the Admiralty badge of a foul anchor,

Bloemfontein.

and the marines a bugle. For seven weeks the brigade remained at Bloemfontein, and owing to the depletion of the ranks from sickness, was there reorganised, the bluejackets being formed into crews sufficient to man three of the 4·7-in. and the 12-pounders, while the fourth 4·7-in. was allotted to the marines. On April 23 Grant's guns were attached to the Highland Brigade and left for the waterworks, and on May 1 the rest of the brigade, under Captain Bearcroft, left for the north with Lord Roberts. Two 12-pounders were left behind in Bloemfontein. The strength of the brigade after the Powerfuls had left was 400, and out of this number ninety went into hospital suffering from typhoid, dysentery, or fever.

Advance into the Transvaal.

After leaving Bloemfontein the brigade, under the command of Captain Bearcroft, was a good deal split up; the main body remained with the Field-Marshal Commander-in-Chief until his arrival at Pretoria, taking part, among other occasions, at the engagements on the Wet River, the Zand River, and that which occurred on June 4, where Commander Spencer de Horsey, whose calmness, ability, and energy are commended by the Captain, was wounded. The movements of this portion of the brigade had been to Brandfort, where it arrived on May 4, from thence to Smaldeel, distance twenty-one miles, which was reached on May 6, from thence to Kroonstadt, where the brigade arrived on May 12. Kroonstadt was not left until May 22, the Rhenoster River was crossed two days later, the Vaal River at Viljoen's Drift on May 27, and Johannesburg on May 21. Here the portion of the Naval Brigade present marched past the Field-Marshal Commanding-in-Chief, and camped out about seven miles on the Pretoria road. The next action was that already mentioned, on June 4, and on the following day the entry was made into Pretoria, the brigade during this latter portion of the march having been attached to the 11th Division, with which it marched on to Christenin, about eight miles east of Pretoria on the Middleburg road, where it encamped. Four men of the Tartar, who had been taken prisoners in the armoured train disaster of November 15, here rejoined the brigade, having escaped from the Boers. In spite of the long forced march the officers and men had stood the strain well, and so had the guns and their mountings, though part of these had to be renewed. The general conduct of the men, says Captain Bearcroft, was very good indeed.

East of Pretoria.

Throughout the months of August and September the four guns under Captain Bearcroft were continually at work in the advance to the eastward, sometimes together and sometimes in divisions. Major Marchant, R.M.L.I., went as far as Belfast with a 4·7-in., while Lieutenant Back carried his two 12-pounders right to Koomati

Poort, the Headquarters, proceeding to Barberton. During this time the guns were frequently in action, and the casualties, although few, included Lieutenant L. O. Wilson, R.M.L.I., on August 26, when the heavier guns were in position on Monument Hill, covering the advance of the Cavalry Division and the Guards' Brigade. The journey from Belfast to Barberton was over exceptionally heavy country, with bad roads, steep pitches both up and down, and many drifts, causing a heavy strain on the gun wheels; indeed, on this and other occasions breakdowns occurred, but the men worked indefatigably day and night, and the ingenuity and resourcefulness of the artificers and handicraftsmen attached to the brigade enabled matters to be put right with hardly any delay. The march of the 12-pounder battery with the force under General Pole-Carew was a most remarkable piece of work, among much which is remarkable. From September 6, when the guns were encamped at Waterval Onder, to September 23, when they arrived at Koomati Poort, the distance covered was 144 miles, and much of it over mountainous and rough country. These guns were returning by train to Pretoria when they ran into another one which was being shunted. Two trucks of the latter were completely smashed, but by the aid of drag-ropes and hydraulic jacks the wreckage was most expeditiously cleared away by the bluejackets, and the line reported "clear" to headquarters in less than two hours. In this work, says Lieutenant Back, who was in command, the armourer and three stokers were of great service.

Return to Simonstown.

On October 7 the three divisions of Captain Bearcroft's command reassembled at Pretoria, where the brigade was inspected by the Field-Marshal Commanding-in-Chief, when Lord Roberts expressed his high appreciation of the services rendered by the bluejackets and marines. It was on this occasion that the Field-Marshal sent the following telegram home: "I wished Captain Bearcroft and the Naval Brigade good-bye to-day. They leave for Capetown to-night, carrying with them the thanks and good wishes of the army in South Africa for the able assistance they have afforded throughout the war."

Services of the brigade.

The brigade arrived at Simonstown on October 12, and Captain Bearcroft, on relinquishing the command, makes the following observations in a despatch to the Admiral: "The work of the brigade has been of a novel and more or less arduous nature throughout, the guns having travelled upwards of eight hundred miles after leaving Modder River, over country of all sorts. The marching powers and endurance of the men have exceeded my expectations, while the energy, zeal, and cheerfulness of officers and men under all circumstances have been most satisfactory and encouraging. The general

conduct of the men has been most exemplary, in spite of the many temptations placed in their way during enforced periods of inactivity at Modder River, Bloemfontein, Pretoria, and Barberton."

Grant's Guns.

It has already been noted that Commander Grant was detached by Captain Bearcroft at Bloemfontein on April 23 and placed under the orders of General Colvile, with two guns. He did not again rejoin, but, under different military commanders, took part in a number of fights, and was for days at a time under fire. In his final report on the operations, Commander Grant gives the following table and information respecting the work done by his two guns.

The summary of work done is as follows :—

	Days Marching.	Miles.	Miles average March
Enslin to Bloemfontein	14	169	12·1
Bloemfontein to Winburg	8	95½	11·94
Winburn to Heilbron	8		
Eight days consecutive marching, with fighting on five of them . . .	—	127	15·9
Chasing De Wet	17	265	15·6
Potchefstroom Column	20	310	15·5
Total	67	966½	14·43

Marching to positions and fights, etc., and returning to camp—about 70 miles.

Total 1,036

On August 1 Grant's guns were attached to General Hart's Brigade and took part in the chase of De Wet, during which 250 miles were covered in fifteen consecutive days, giving an average of 16·7 miles. The longest marches were thirty-seven miles in thirteen and a quarter hours, and thirty-seven miles in twenty-five hours. Fourteen of the day's marches included in the above table were from two to six miles and nine more ten miles and under. Deducting these, 816 miles were marched in forty-four days, with an average of 18·5 miles. On the twenty-five different occasions on which the guns fired in action, counting the eight or ten days' bombardment of Paardeberg as one, 520 rounds were fired, the longest range being 9,000 to 10,000 yards and the shortest 1,900 yards. Commander Grant says in his despatch: "I have much pleasure in reporting that the spirit, endurance, and behaviour of officers and men throughout the campaign has been beyond praise. Work, often under conditions of great hardship, requiring endurance and spirit to a very high degree, has been met throughout with the greatest spirit and cheeriness, and the smartness, discipline, and soldierly qualities they

have displayed will, I am sure, ever be remembered to their credit and that of the Naval Service. In no single instance has Lieutenant Ferguson ever had to bring a man before me for any crime, neglect of duty, slackness, or any other offence whatsoever, and this for a period of nearly nine months. The marching powers displayed by the men have been to me quite a revelation, and by no troops in South Africa have I seen them excelled."

In South Africa then, the Navy did well; naval officers occupied important posts; naval officers introduced a revolution as regards all former ideas of the mobility of heavy siege guns, and in all the brigades the seamen and marines earned the praise of the naval and military chiefs alike. The Admiralty expressed their opinion in the following words: "The Navy upheld the traditions of the service and added to its reputation for resourcefulness, courage, and devotion."

The Navy in China.

The origin of what it is the custom to call the crisis in China, or any investigation of the causes which led to the events at Pekin last year, would be foreign to our purpose here. The story of the work of the Navy may be said to begin with the despatch of a Legation Guard consisting of three officers and seventy-two men to the Chinese capital at the request of our Minister. This guard arrived in Pekin with similar representatives of the American, French, Russian, Japanese, Italian, and other forces despatched to protect their Legations. What happened in Pekin will be told in its place, but an account of the work of the Navy in this connection naturally divides itself under four heads:—the Seymour Expedition, the capture of the Taku Forts, the defence of Tientsin, the siege and relief of the foreign legations in Pekin; and in this order I propose to deal with them.

Admiral Seymour's Expedition.

Four days after the arrival of the Legation Guards, railway communication with Pekin was finally interrupted, and this, following upon the massacre of British missionaries by the turbulent Boxers, was sufficiently alarming to point to the fact that it was no mere temporary wave of local excitement which had to be met. A large number of ships of the different Powers had assembled off the mouth of the Peiho, and Sir Edward Seymour, as the senior naval officer, suggested a conference at which all the senior officers of the naval forces were present, and it was agreed to take such measures as might become necessary in conjunction. The fact that the Legations were also seriously imperilled necessitated a military step almost immediately. Telegraphing from Tongku on June 10 to the Admiralty, Sir Edward Seymour reported the following telegram from the Minister at Pekin: "Situation extremely grave, unless

arrangements are made for an immediate advance to Pekin it will be too late." In these circumstances there was only one thing to do. All the available men from the squadrons were landed to the number of about 2,000, and the British Admiral, placing himself at the head of this force, attempted to reach Pekin in order to effect the relief of the besieged Legations. When the Admiral thus started in his gallant attempt to relieve the women and children, whose position appeared to have become desperate, everything pointed to the success of a bold and determined display of force. As the Japanese Admiral reported, up to the moment when the expedition started on June 10 there was no reason to doubt the friendly disposition of the Chinese authorities. After passing Yangtsun, where it was found that the Boxers had made attempts to destroy the bridges and had torn up the sleepers of the railway, the workmen and materials for the repair of the track were furnished by the Viceroy of Chi-li. It was not indeed until seven days later, when the column was less than half way to Pekin, that the Chinese troops made a hostile demonstration. The changed attitude on the part of the Chinese authorities appears to have been directly connected with the bombardment of the Taku Forts, which were stormed and captured at dawn on the 17th, the morning before Admiral Seymour's expedition was attacked at Lang Fang by General Tung's foreign-trained troops equipped with modern arms. The radical alteration in the situation brought about by the introduction of this new factor was at once appreciated by the Admiral. He thereupon decided to abandon his advance by the railway and to return by the river to Tientsin, carrying his wounded in boats. It is unnecessary to find an excuse for the brave and gallant attempt made by Sir Edward Seymour and his colleagues. Although the undertaking was made impossible of achievement, its glory remains. As the Admiral has himself said, "I am aware, was aware, of its risks; but to my mind no other course was open to me in view of the urgent appeal from Pekin. I could not with honour have held back. I went myself as the best and only possible way to put all under one head. When the Imperial Chinese troops, in numbers unknown, took arms against us, the project became impossible and retreat difficult. Two or three times our prospects were very dark and disaster seemed not improbable; yet I never regretted that I had started, as I could not have respected myself if I had not done so." The immediate purpose of the expedition failed, it is true, but the failure was of a kind which marks in glowing colours some of the brightest pages in our history.

The accounts of what befel the expedition, both public and private, are numerous. They paint a vivid picture of the hardships and perils

experienced by the column, and bear ample testimony not only to the pluck and endurance shown by all who took part in the expedition, but also to the healthy spirit of combined emulation and mutual helpfulness which united in a common effort the seaman and marines of eight different nationalities. The principal battle appears to have been that which was fought at Lang Fang on June 18, the battle which decided the Admiral to turn back. The allied force here consisted only of about one-third of the expedition, the British detachment being supplied by the Endymion, Aurora, and Orlando. The enemy numbered about 5,000, and it was not until after between two and three hours' hard fighting that the attack was repulsed. The enemy sustained a loss of between 400 and 500, while the loss on our side was 58 killed and wounded. Two days previously the Admiral had discovered that his communications with Tientsin had also been cut, that the bridge at Yangtsun was destroyed, and that the trains were useless. The task before him was to secure a retreat, and by the skill, courage, and discipline of those with him, and the ability, gallantry, and tact of the Admiral himself, and the loyalty of the foreign officers who accepted his wishes as orders, this task was successfully achieved and without disaster. The narratives of those engaged relate how day by day they had to fight their way with the ammunition supply running short, and encumbered by the wounded who could not be abandoned because the Chinese beheaded all who fell into their hands. Admiral Seymour himself testifies to the hard straits they were put to, "drinking Peiho water, which is like red pea soup, plus the most awful things thrown into it." And again, "at one time we shot a horse and its rider in action in the morning and ate the former in the evening." It was not until June 22, when the column seized the Hsiku Arsenal and found therein a store of rice, that the danger of starvation passed, for all the stores and provisions save a very trifling amount were necessarily abandoned with the trains. Relief came on Monday, the 25th, when a force from Tientsin cleared the line of communication and enabled the expedition to make good its withdrawal from the Arsenal.

Battle of Lang Fang.

The retirement.

Harmony among the Allies.

Not the least among the pleasing features of the despatches from the different commanders are those which bear testimony to the perfect harmony which prevailed among the units of the allied force. From first to last there never was a breath of dissension; the foreign officers speak in the most enthusiastic terms of Sir Edward Seymour, and he bears testimony to the valour and whole-souled assistance given to him when in a trying and unexampled position. This singularly daring and dangerous march is one which will always be remembered as among the most stirring and adventurous of our time.

In an order issued to the squadron the Admiral pays the following tribute to the services of those with him: "The officers and men landed from Her Majesty's ships and present with me acted throughout, as regards energy, courage, and cheerfulness, in a manner well worthy of the high traditions of Her Majesty's Navy."

Capture of the Taku Forts

We now return to the squadrons which were lying off Taku when the Admiral landed, and to Tientsin, where a naval brigade, under the command of Captain E. H. Bayly, of the Aurora, had been left. On June 15 it was discovered that the Chinese were laying torpedoes in the river Peiho and concentrating regular troops in the neighbourhood of Tientsin as well as in the Taku Forts. The senior officers of the foreign ships then met on board the Russian flagship and addressed an ultimatum to the Chinese commander of the Taku Forts, requiring him to withdraw his troops by two o'clock on the afternoon of June 17. A naval brigade, made up of English, Russians, Italians, Austrians, Germans, Japanese, and French, had been prepared for landing on the previous night and were in readiness to support the demands of the foreigners. At one o'clock on the morning of June 17 the Taku Forts opened fire on the foreign, gunboats in the river. An artillery action ensued which lasted seven hours, when the forts were stormed by the foreign forces.

At the time when these events occurred the vessels lying in the Peiho were (British) the Algerine, Commander R. H. J. Stewart, a steel sloop, 1,050 tons' displacement, mounting six 4-in., one 25-pounder, and four 3-pounders, and two torpedo-boat destroyers, the Whiting and Fame; (German) Iltis, gunboat, 894 tons displacement, eight 3·4-in., six 1·4-in.; (French) Lion, wooden gunboat, 503 tons, two 5·5-in. guns; (Russian) Bobr, gunvessel, 950 tons, one 9-in., one 6-in., nine machine-guns, Koreets, gunvessel, 1,213 tons, and Gilyak, gunboat, 963 tons, one 4·7-in., five 3-in., two 2·6-in., and four 1·8-in. guns. The United States steamer Monocacy, and the Japanese vessel Atago were present, but took no part in the action. On the east side of the river, near Tongku, a large force of Japanese and Russians, with some bluejackets from the Orlando and other ships, were encamped, the remainder of the British Naval Brigade being in a tug alongside the Algerine. The larger foreign men of war, to the number of twenty-five, of seven different nationalities, and including the following British ships, Centurion, Barfleur, Orlando, Aurora, and Endymion, were anchored ten miles off the forts outside the Taku bar.

The forts at the entrance to the river were of a very formidable nature. On the north side of the bend which the river makes from the bar there are two forts. The outer fort is casemated with earthworks

throughout, mounting about fifty guns. About a third of a mile up the river is a strong but smaller fort, sometimes called the North-West Fort, mounting about thirty guns. These two defences are connected by a curtain and covered way, with small guns on the parapets. The forts on the south bank stretch along the seashore for about a mile, these batteries mounting about one hundred and twenty guns in all. About a mile inland there is another fort on the south side, built for the protection of the main magazines. All these fortifications had been modernised, and consisted of earthworks with concrete galleries and powerful redoubts, surmounted by lofty cavaliers armed with quick-firing guns. The armament generally, although of a very varied nature, comprised specimens of nearly every description of modern British and German artillery. The garrison of the forts probably consisted of about three thousand regular Chinese soldiers, but no large number of trained gunners.

The attack.

It was a little after midnight when the inner fort on the north side opened fire on the Algerine, and the British vessel replied, the Russian gunboats shortly afterwards joining in the bombardment. Then the German gunboat, which had been moored to one of the railway wharves, cast off and, steaming down the river, came into action, followed by the French gunboat, which had been at anchor higher up the river. These two vessels were cheered by the British and Russians as they took up their stations and replied to the forts, which had now all joined in the fight. The Iltis, Algerine, and Lion dealt principally with the north forts, while the Russians fired on those on the south side. As soon as the battle commenced the Fame and the Whiting attacked four German built destroyers, which were lying alongside the naval yard. The Chinese crews, after the first round, bolted, and these vessels were captured and carried up out of the fire of the forts. The bombardment went on intermittently through the darkness until between four and five o'clock, when the day broke and the Chinese gunners redoubled their exertions. The Russian Gilyak was badly hit and her fore magazine blew up. The men-of-war now got under way, and almost immediately the German Iltis was badly hit and had to be beached. A little later a shell from the Algerine blew up one of the southern magazines and the Naval Brigades began, at about the same time, their advance. The bombardment went on, however, and it was not until half-past seven that all the forts were silenced and their garrisons were flying before the storming parties. The storming of the forts was a very quick business, the brigades charging right into them, capturing the north-west fort first, where the Japanese lost several men, including their commander, and the British had one or two wounded. The second north fort was captured

unopposed, and the Germans turned its guns, which were similar to those in their ships, upon the forts on the south bank. Then the brigades crossed the river and captured the south forts without opposition. The losses on the side of the Allies in the bombardment were :—British, one officer wounded, three men killed; German, six men killed, fifteen wounded; France, one officer killed, one man wounded; Russians, three officers wounded, sixteen men killed, and forty-two men wounded. Commander R. H. J. Stewart, of the Algerine, well and ably handled his ship in this action, and Rear-Admiral Bruce, in reporting the matter, mentions that the manner in which he manœuvred his vessel largely contributed to the success achieved, which at one time was extremely doubtful. He adds that the way in which the Algerine was taken close under the forts, so that most of their shot went over her, accounts for her small loss. "He (Stewart) and the Captain of the Iltis, were always contending for the post of danger, and the German officer is, I regret to say, severely wounded in several places." The British landing party was under the command of Commander C. G. F. M. Cradock, whose conduct, with that of the officers and men under him, was mentioned in the Admiral's despatch as worthy of the highest praise.

Tientsin.

At this time the communication with Tientsin had been severed, and the Seymour Expedition had not been heard from for more than a week, and was generally believed to have been destroyed. The problem therefore which presented itself to Admiral J. A. T. Bruce and his foreign colleagues was to reopen the line to Tientsin and to discover the whereabouts of the Vice-Admiral and his force, if still in existence. With this purpose in view a force of Russians and Americans advanced towards Tientsin, but were repulsed about twelve miles from the city. On June 21 an Englishman, with three Cossacks, brought the news, having pluckily ridden through the Chinese lines, that the garrison was still holding the foreign settlement, but was incessantly bombarded from the Chinese arsenal and forts. A larger relief expedition was then organised, a brigade of 200 bluejackets, under Captain Cradock, forming part of it. This force left Taku on June 22, and after two days' fighting arrived at Tientsin, reopening the communications. The garrison of Tientsin was now strong enough to attempt to succour the force under the Commander-in-Chief, which was known to be only eight miles distant to the north. On June 25, therefore, a relief force was despatched to the Hsiku Arsenal, and the whole body returned on the following day.

Defence of Tientsin.

The defence of Tientsin covers the whole period from June 10, when Sir Edward Seymour passed through to the north, until

July 13–14, when the native city was carried by the allied forces, and the road thereby opened to Pekin, although it was not until August 5 that the relief force marched out and defeated the Chinese entrenched at Peitang, and not until August 15 that Pekin was entered by the Allies, after a stubborn resistance. The brunt of the earlier portion of the defence fell upon the British and the Russians; indeed, if the latter, who formed the larger part of the garrison, had not held the bridge of boats, there might not have been any foreigners left alive in the place. A constant battle raged round the railway station, the French settlement was completely burnt down, and scarcely a day passed without increased activity on the part of the enemy. Sir Edward Seymour, in his despatches, divides the above period into three stages—the fortnight between June 10 and June 26, when he himself arrived on the scene, then from June 26 to July 11, when he returned to his flagship, and from the last-named date to the date of the capture of Tientsin City—with the result already referred to.

Dealing with the first stage, we find that immediately after Sir Edward Seymour had left the Chinese began to obstruct the work of sending forward reinforcements, and trains were with difficulty sent through until the 14th, when the line was completely destroyed. On June 11 Captain Bayly's brigade was reinforced by 150 seamen and marines, under Commander D. Beatty, of the Barfleur, and on the 13th about 1600 Russians, with cavalry and field-guns, arrived. The settlement was attacked on June 16, but the Russians drove the attacking party away after they had set fire to several stores and houses. The Chinese also made attempts now to cut the line communicating with Tongku, but were driven off by a naval force under Lieutenant G. B. Powell, of the Aurora. The same day the Military College across the river, which commanded the British concession, was taken by a party of the allied forces, under Major E. V. Luke, of the marines, and the building, with the guns found in it, destroyed. On June 18 an engagement took place round the railway station, in which two British companies, under Commander Beatty and Lieutenant P. N. Wright, of the Orlando, did good service. On the next day an unsuccessful attempt was made by the British seamen and marines to capture some Chinese guns near the railway embankment. In this action Commander Beatty, Lieutenants F. Powell and A. J. B. Stirling, Mr. A. P. Donaldson, midshipman, and eleven men were wounded. Mr. Donaldson died of his wounds on July 3. The same day a shell from one of the Chinese guns struck Lieutenant Wright, who was on the roof of the Consulate, inflicting most dangerous wounds on his head and arms. Throughout the remainder of the period under consideration small attacks and skirmishes took place daily,

while the Concession was almost unceasingly bombarded from the native city. Sir Edward Seymour, referring to these operations, which he considers to have reflected great credit on all concerned, remarks that Captain Bayly, whose duties were most constant, harassing and onerous, displayed throughout great calmness, energy, and good judgment, and a tact and temper quite remarkable.

In the second period the principal actions occurred on June 27 and July 4. On the first occasion a naval force, under the command of Captain Burke, of the Orlando, supported a Russian attack on the Arsenal. They had to push forward on a flat plain for a considerable distance under a flanking fire, and when they were advancing were subjected to a harassing shrapnel fire from a field gun. At about 250 yards from the Arsenal our men fixed bayonets and charged, driving out the enemy. The British casualties were seven killed and twenty-one wounded, including two officers. On July 4 a British battalion, under Captain C. D. Granville of the flag-ship, was sent out to reinforce the French and Japanese, who were repelling an attack made by the Chinese on the railway station. For three hours the bluejackets remained in a pouring rain under a heavy shell fire, when eventually the Chinese were repulsed. We had several men wounded and one killed. Two additional 12-pounder guns on Scott's mountings were received in Tientsin this day—making three in all, the other guns with the Naval Brigade being two 9-pounder muzzle loading guns, and three 6-pounder hotchkiss. The movement which was to result eventually in the capture of the native city began virtually on July 6, when a bombardment intended to keep down the fire of the Chinese guns was begun, as well as various attempts to capture their artillery. Mr. F. S. D. Esdaile, midshipman, of the Barfleur, was wounded in one of these engagements. In the final operations of the 13th and 14th the Naval Brigade, numbering a little over 300 bluejackets and marines under Captain Burke, of the Orlando, joined the left attacking column in support of the Japanese. It was on this occasion that Captain H. T. R. Lloyd of the Marines, who had been engaged in every action, both in the Seymour Expedition, and those which had taken place around Tientsin, was killed. The Naval Brigade had their full share in the fighting and were among the first to enter the native city.

In publishing the China despatches the Admiralty included a letter dated October 1, to the Commander-in-Chief, in which they expressed their high appreciation of the tact and judgment displayed by the Admiral in his gallant attempt to relieve the Legations at Pekin, which they believed to have contributed so greatly to the harmonious feeling that prevailed between the various sections under his orders.

P 2

Their lordships considered that having been suddenly called upon to assume command of a mixed force comprising representatives of almost every nation, great credit was due to the Admiral for the rapidity with which this force was organised, and for the manner in which the expedition was conducted in view of the great difficulties necessarily attending it, and the overwhelming numbers of the opposing forces. Their lordships also noted that they had read with great pleasure the Admiral's testimony to the courage shown and the hardships cheerfully endured by the officers and men in the expedition, and they wished to express to all concerned their unqualified satisfaction at receiving this high commendation of their conduct.

Pekin Relief Force.

The Naval Brigade, formed for the advance on and the relief of Pekin, in company with H.M.'s military forces under Lt.-Gen. Sir Alfred Gaselee, K.C.B., commanding the China Expeditionary Force, was commanded by Capt. George A. Callaghan, R.N., of the Endymion, with Commander R. S. Fraser, of the Phœnix, as second in command, and comprised 21 officers, and 500 seamen and marines, with two 4-in. quick-firing guns and four 12-pounder quick-firing guns.

The Naval Brigade was formed at Tientsin on July 30, the four 12-pounder quick-firing guns being mounted on temporary field-carriages. The field mountings for the two 4-in. quick-firing guns were constructed at the factory at Taku, under the superintendence of Mr. A. Dupen, engineer of H.M.S. Phœnix, by the artificers of the Endymion and Phœnix. On August 3 the Naval Brigade moved out from Tientsin and marched to Hsiku (about 8 miles) and camped there, the 12-pounder quick-firing guns being conveyed there by junks and disembarked. The two 4-in. quick-firing gun mountings not being completed, Commander Fraser and 50 men were left behind at Tientsin to bring them on when ready.

Fight at Peitsang.

On the morning of August 5 at 4 A.M. the Naval Brigade advanced with the allied forces and attacked the enemy's position at Peitsang. Three of the 12-pounder quick-firers were brought into action to support the Russian attack on the extreme right on the left bank of the Peiho. The guns opened fire at a range of 5,500 yards, and continued the attack on the bridge, and after drawing shell fire of considerable accuracy from the enemy, drove them from their position, and later shelled the enemy, who formed up in retreat on open ground (at a range of 8,800 yards), and dispersed them to the northward. The naval guns were supported in this action by the Royal Marine Battalion under Major E. V. Luke. At about 11 A.M. the guns advanced on Peitsang, which was occupied without further resistance, the allied forces camping there for the night.

On the morning of the 6th the 12-pounder guns were placed in

the gun junks, and the forces advanced at 6 A.M., the Naval Brigade following the bank of the river with the guns in the junks. Owing to the delay in cutting the Japanese boat bridge at Peitsang, the guns did not reach Yangtsun until after that place was in the hands of the Allies. Yangtsun was reached at 7 P.M. that day. At 8 A.M. on August 8 a fresh advance was made, the naval guns advancing in the junks, with the gun crews marching along the river bank. The marine battalion was now brigaded with the troops of the 1st Brigade under Brig.-Gen. Sir N. Stewart. At 4.30 P.M. on August 9 the junks arrived at Hosiwu, which place only offered a very slight resistance. Capt. Mullins, R.M.L.I., was left here as post commandant with 200 allied troops, including 50 marines.

Advance of the column.

On August 10 the guns advanced at 7.30 A.M. by the river (three hours in advance of the troops), and, stopping at 9 P.M., continued to advance at 4 A.M. on the 11th, arriving at Matao at 3 P.M. the same day. The heat was intense, many casualties occurred among the cavalry and artillery horses, and a large number of troops, including marines, fell out. It was remarkable that no seamen were affected much by the sun, although wearing only straw hats, while British troops in helmets and American troops in "slouch" hats suffered considerably. After a rest of two hours at Matao, the naval guns continued their advance. Considerable difficulty was now experienced in the navigation, the river being very low in some places, and the most ordinary precautions on the part of the enemy—such as blocking the channel—would have entirely prevented the passage by the junks. Tung Chow was reached at 2 A.M. on August 13, and three 12-pounder quick-firing guns disembarked, the junk carrying the fourth gun having grounded some miles down the river. The Royal Marine Battalion again joined the Naval Brigade. At 4.30 P.M. on the same day the naval guns, accompanied by the Royal Marine Battalion, commenced the advance from Tung Chow to Pekin, a distance of 13 miles. The road by which the advance was ordered was that south of the Uliangho, and was in very bad condition. In many places the gun wheels were almost below the level of the mud through which they had to be drawn. The Japanese ponies, which had been provided to assist to drag the guns, were practically useless, never having been trained for draught, and the work of drawing the guns devolved almost entirely upon the gun crews, and it was found necessary to reduce the marine battalion to a small advance guard, and use the remainder on the drag ropes. The march was a very trying one. During the evening of August 13 rain fell in torrents and filled the roads. A halt was made at 10 P.M., and the Naval Brigade bivouacked for the night just beyond the Palikoo

Bridge. At 3.30 A.M. on August 14 a fresh start was made, progress being difficult owing to the muddy road and the sun becoming intensely hot. A midday halt was made about 5 miles from Pekin, and finally the naval guns reached a position under the walls at about 5 P.M., and camped there for the night, the British troops having entered the city about 3 P.M., and the other nationalities shortly after. At 4 A.M. the Naval Brigade entered the city and proceeded to the "Temple of Heaven," and later were sent to guard the east gate of the Chinese city, the Royal Marine Battalion going to the British Legation, and being again temporarily brigaded with the 1st Brigade. At daylight on August 16 the Royal Marine Battalion co-operated with the French troops in the relief of Peitsang, and returned and garrisoned Coal Hill, Imperial City. The seamen and marines remained in Pekin sixteen days, sending out foraging parties, and the seamen patrolling the south-east quarter of the Chinese city.

Relief of Pekin.

On Tuesday, August 28, a detachment of seamen and marines (thirty of each) took part in the triumphal march through the Forbidden City. On August 31 the whole of the Naval Brigade, including the marines who had formed the Legation Guards during the siege, left Pekin and marched to Tung Chau, arriving that evening, and embarked and proceeded down the river, picking up the detachment at Hosiwu, and arriving at Tientsin on September 3, returning to their ships at Taku on September 5. One of the two 4-in. quick-firing guns under Commander Fraser left Tientsin on August 9 by junk, and reached Tung Chau on the 18th, and returned to Tientsin four days later.

The defence of Pekin.

It has already been explained that, in response to a request from the Minister in Pekin, a Legation Guard was ordered to that place. The Guard arrived in Pekin on the night of May 31, and consisted of 3 officers, 75 non-commissioned officers and men, 1 bugler, 1 armourer, 1 signalman, and 1 sick berth steward. The officers were Captain B. M. Strouts, who was in command, Captain L. S. T. Halliday, of the Orlando, which ship contributed 27 of the marines, the signaller, the armourer, and the sick berth steward, and Captain Edmund Wray. Ordinary guard duties were performed by the marines until June 13, on which date a party of Boxers entered the Tartar City near the Legation settlement, and from this date onwards the detachment was continuously on the alert and at the posts in the defence. The active siege continued until July 17, when there was a practical cessation of firing until August 5. The siege was raised on the afternoon of August 14 by the Allies.

The following account is compiled in the main from a diary kept by Captain Wray who succeeded to the command after Captain

Strouts and Captain Halliday had been wounded. On June 14 the picket of an officer and 12 men on the north bridge was attacked by some hundred Boxers, who were repulsed, losing four killed and two wounded. On the following day Captain Halliday, with a combined force of British and German marines, rescued several hundred Chinese Christians who were being massacred by Boxers. On June 17 the Chinese Imperial troops attacked the picket on the north bridge, and two days later the Chinese Government issued an ultimatum demanding that all the ministers should leave Pekin within twenty-four hours. It was decided to remain and defend the Legations. On June 20 the picket on the north bridge was withdrawn, and our sentries at the front gate opened fire for the first time on Imperial troops. The following day Sir Claude MacDonald took supreme command of the Legations Settlement, and on June 22 an unsuccessful attempt was made by Boxers to burn the Legations at the south-west corner. Captain Poole, with 15 marines, reconnoitred the Hanlin, which, on the 23rd, was set on fire by the Chinese with the object of burning the Legation from the north. Captain Halliday, later, with 30 marines was sent by Captain Strouts to drive the enemy from the houses behind the First Chinese Secretary's house. He was attacked by the Chinese and wounded, but killed four or five of his assailants with his revolver, and subsequently returned to the Legation. Captain Strouts then took charge, and succeeded in driving the enemy back and capturing some arms and ammunition. On June 29 Captain Wray made a sortie for the purpose of capturing the Krupp gun which the Chinese had used against the Legation with some effect. He was assisted by a mixed force of British, German, and Russian marines, but it was finally discovered that the gun had been withdrawn. July 8 was notable as being the day on which an old smooth bore gun was found and mounted by an American gunner, assisted by Armourer Thomas, R.N., who also manufactured the ammunition, the projectiles being the shells of a modern Russian field gun.

From July 11 onwards British marines were constantly sent to reinforce the Japanese and Italian posts in the Suan Fu, where the heaviest attacks of the Chinese were directed, and on the 12th Captain Wray himself took command of the Italians at their post, as the Italian officer commanding had been killed. On July 16, while returning from a visit to Captain Wray's post, Captain Strouts was mortally wounded, and died three hours later. Captain Halliday was the next in seniority, but being still unfit for duty Captain Wray took command. From July 17 until August 4 there was a cessation of hostilities, except for a little sniping on both sides,

but chiefly on the part of the Chinese, and on August 13 the Chinese Government issued orders to the effect that any Chinese soldier firing on the Legations would be court-martialled. Naturally, numbers of men distinguished themselves during the siege, and Captain Wray makes special mention of Lance-Sergeant Preston of the Orlando. It appears that on July 14 the enemy had been driven down from their barricade on the Imperial Carriage Park wall near the West Hanlin by shell fire, and this N.C.O. seeing a banner left by the enemy climbed on to the wall, some 12 ft. high, to capture it. Finding that he could not reach it, he called for his rifle to be given to him, and pushing down part of the barricade he kept the enemy, some fifty in number, at bay, while an American gunner laid hold of the flag, which was eventually brought into the Legation. Mention is made of others who distinguished themselves by an officer writing to the *Times*. He says the odd men did excellent work. Harry Swannell, leading signalman of the Orlando, was erecting a staff on the wall when he observed the relief force approaching, and at once signalled for them to enter by the Water Gate. The force was on the point of turning back, but when the signal was read out pushed on and soon relieved the besieged Legations. J. Thomas, armourer of the Orlando, was the only skilled workman in that line with the international guard, and displayed great ingenuity in manufacturing ammunition of all kinds. R. Fuller, sick-berth attendant, also of the Orlando, was the only qualified nurse present in the Legations, and rendered invaluable services to the sick and wounded of nine nationalities till he himself was knocked over by dysentery. In a letter to Admiral Sir Edward Seymour, the then British Minister at Pekin, Sir Claude MacDonald, said he could not speak in any other terms but those of the highest praise of the behaviour of the officers. They were exposed, day and night, for two months to the most arduous, irksome, and responsible duties, which they fulfilled with a cheerful alacrity, and with a courage and endurance which excited the admiration of everybody. The general good conduct, soldierly bearing, and steadiness under fire of the men of the detachment were worthy of the highest traditions of the British Army, and of the corps to which they belong. This high state of excellence was undoubtedly in a great measure due to the officers and non-commissioned officers. "Captain Strouts was an excellent soldier and a gallant gentleman," says Sir Claude, "and his loss to me and to the defence generally was irreparable. Had he lived I should certainly have recommended him to the Lords of the Admiralty through your Excellency, for promotion, or for the Distinguished Service Order."

An Honours List in connection with the naval operations in South Africa was published in *The London Gazette* of October 3, and one in connection with the operations in China in *The London Gazette* of October 5. In the latter it was notified, among other rewards and promotions, that the Queen had been graciously pleased to approve of the Victoria Cross being conferred upon Mr. Basil J. D. Guy, midshipman, for gallantry and endeavouring to save the life of a bluejacket while under fire, during the attack on Tientsin City on July 13. In *The London Gazette* of January 2 it was announced that the Queen had been pleased to signify her intention to confer the Victoria Cross upon Captain (now Brevet-Major) Lewis S. T. Halliday, R.M.L.I., for an act of gallantry performed on June 24, 1900, during the siege of the Pekin Legations.

CHAS. N. ROBINSON.

CHAPTER XI.

War and its Chief Lesson.

(For Study at the beginning of a New Century.)

War knowledge and peace training.

Had the expression "real war" been introduced into the title of this chapter, its introduction would be justifiable. What may be, grammatically, a pleonasm is not necessarily one practically when distinction of meanings and precision are of urgent importance. The sources—if not of our knowledge of combat, at least of the views which are sure to prevail when we come to actual fighting—are to be found in two well-defined, dissimilar, and widely separated areas. Within one are included the records of war; within the other, remembrance of the exercises and manœuvres of a time of peace. The future belligerent will almost of a certainty have taken a practical part in the latter, whilst it is probable that he will have had no personal experience of the former. The longer the time elapsed since hostilities were in progress, the more probable and more general does this absence of experience become. The fighting man—that is to say, the man set apart, paid, and trained so as to be ready to fight when called upon—is of the same nature as the rest of his species. This is a truism; but it is necessary to insist upon it, because professional, and especially professorial, strategists and tacticians almost invariably ignore it. That which we have seen and know has not only more, but very much more, influence upon the minds of nearly all of us than that of which we have only heard, and, most likely, heard but imperfectly. The result is that, when peace is interrupted and the fighting man—on both sea and land—is confronted with the problems of practical belligerency, he brings to his attempts at their solution an intellectual equipment drawn—not from knowledge of real war, but—from the less trustworthy arsenal of the recollections of his peace training.

When peace, especially a long peace, ends, the methods which it has introduced are the first enemies whom the organised defenders of a country have to overcome. There is plenty of evidence to prove that—except, of course, in unequal conflicts between highly organised civilised States and savage or semi-barbarian tribes—success in war

is directly proportionate to the extent of the preliminary victory over the predominance of impressions derived from the habits and exercises of an armed force during peace. That the cogency of this evidence is not invariably recognised is to be attributed to insufficient attention to history and to disinclination to apply its lessons properly. A primary object of the *Naval Annual*—indeed, the chief reason for its publication—being to assist in advancing the efficiency of the British Navy, its pages are eminently the place for a review of the historical examples of the often-recurring inability of systems established in peace to stand the test of war. Hostilities on land being more frequent, and much more frequently written about, than those by sea, the history of the former as well as of the latter must be examined. The two classes of warfare have much in common. The principles of their strategy are identical; and, as regards their main features, so are those of the tactics followed in each. Consequently the history of land warfare has its lessons for those who desire to achieve success in warfare on the sea.

Lessons of land warfare.

That this has often been lost sight of is largely due to a misapprehension of the meaning of terms. The two words "military" and "army" have been given, in English, a narrower signification than they ought, and than they used, to have. Both terms have been restricted in their use, and made to apply only to the land service. This has been unfortunate; because records of occurrences and discussions, capable of imparting much valuable instruction to naval officers, have been passed over by them as inapplicable to their own calling. It may have been noticed that Captain Mahan uses the word "military" in its right sense as indicating the members, and the most important class of operations, of both land and sea forces. The French, through whom the word has come to us from the Latin, use it in the same sense as Mahan. *Un militaire* is a member of either a land army or a navy. The "Naval *and* Military Intelligence" of the English press is given under the heading "*Nouvelles Militaires*" in the French. Our word "army" also came to us direct from the French, who still apply it equally to both services—*armée de terre, armée de mer.* It is a participle, and means "armed"; the word "force" being understood. The kindred words *armada* in Spanish and Portuguese, and *armata* in Italian—equally derived from the Latin—are used to indicate a fleet or navy, another name being given to a land army. The word "army" was generally applied to a fleet in former days by the English, as will be seen on reference to the *Navy Records Society's* volumes on the defeat of the Spanish Armada.

This short etymological discussion is not inappropriate here, for

it shows why we should not neglect authorities on the history and conduct of war merely because they do not state specially that they are dealing with the naval branch of it.

The effect of peace training on belligerent efficiency.

A very slight knowledge of history is quite enough to make us acquainted with the frequent recurrence of defeats and disasters inflicted on armed forces by antagonists whose power to do so had not been previously suspected. It has been the same on the sea as on the land, though—owing to more copious records—we may have a larger list of events on the latter. It will not be denied that it is of immense importance to us to inquire how this happened, and ascertain how—for the future—it may be rendered highly improbable in our own case. A brief enumeration of the more striking instances will make it plain that the events in question have been confined to no particular age and to no particular country.

Its disappointments.

It may be said that the more elaborately organised and trained in peace time an armed force happened to be, the more unexpected always, and generally the more disastrous, was its downfall. Examples of this are to be found in the earliest campaigns of which we have anything like detailed accounts, and they continue to reappear down to very recent times. In the elaborate nature of its organisation and training there probably never has been an army surpassing that led by Xerxes into Greece twenty-four centuries ago. Something like eight years had been devoted to its preparation. The minute account of its review by Xerxes on the shores of the Hellespont proves that—however inefficient the semi-civilised contingents accompanying it may have been—the regular Persian army appeared, in discipline, equipment, and drill, to have come up to the highest standard of the most intense "pipeclay" epoch. In numbers alone its superiority was considerable till the last, and down to the very eve of Platæa its commander openly displayed his contempt for his enemy. Yet no defeat could be more complete than that suffered by the Persians at the hands of their despised antagonists.

Persian defeat at Platæa.

Athenian failure at Syracuse.

As if to establish beyond dispute the identity of governing conditions in both land and maritime wars, the next very conspicuous disappointment of an elaborately organised force was that of the Athenian fleet at Syracuse. At the time Athens, without question stood at the head of the naval world: her empire was in the truest sense the product of sea power. Her navy, whilst unequalled in size, might claim, without excessive exaggeration, to be invincible. The great armament which the Athenians despatched to Sicily seemed, in numbers alone, capable of triumphing over all resistance. If the Athenian navy had already met with some explainable mishaps, it looked back with complacent confidence on the glorious achievements

of more than half a century previously. It had enjoyed many years of what was so nearly a maritime peace that its principal exploits had been the subjection of states weak to insignificance on the sea as compared with imperial Athens. Profuse expenditure on its maintenance; the "continued practice" of which Pericles boasted, the peace manœuvres of a remote past; skilfully designed equipment; and the memory of past glories—all these did not avail to save it from defeat at the hands of an enemy who only began to organise a fleet when the Athenians had invaded his coast waters.

Fall of Sparta.

Ideal perfection as a regular army has never been so nearly reached as by that of Sparta. The Spartan spent his life in the barrack and the mess-room; his amusements were the exercises of the parade ground. For many generations a Spartan force had never been defeated in a pitched battle. We have had, in modern times, some instances of a hectoring soldiery arrogantly prancing amongst populations whose official defenders it had defeated in battle; but none such could vie with the Spartans in the sublimity of their military self-esteem. Overweening confidence in the prowess of her army led Sparta to trample with ruthless disdain on the rights of others. The iniquitous attack on Thebes, a State thought incapable of effectual resentment, was avenged by the defeat of Leuctra, which announced the end of the political supremacy and the military predominance of Sparta.

Ruin of Carthage.

In the series of struggles with Carthage which resulted in putting Rome in a position enabling her eventually to win the dominion of the ancient world, the issue was to be decided on the water. Carthage was essentially a maritime State. The foundation of the city was effected by a maritime expedition; its dominions lay on the neighbouring coast or in regions to which the Carthaginians could penetrate only by traversing the sea. To Carthage her fleet was "all in all": her navy, supported by large revenues and continuously maintained, was more of a "regular" force than any modern navy before the second half of the seventeenth century. The Romans were almost without a fleet, and when they formed one the undertaking was ridiculed by the Carthaginians with an unconcealed assumption of superiority. The defeat of the latter off Mylæ, the first of several, came as a great surprise to them, and, as we can see now, indicated the eventual ruin of their city.

We are so familiar with stories of the luxury and corruption of the Romans during the decline of the empire that we are likely to forget that the decline went on for centuries, and that their armed forces, however recruited, presented over and over again abundant

signs of physical courage and vigour. The victory of Stilicho over Alaric at Pollentia has been aptly paralleled with that of Marius over the Cimbri. This was by no means the only achievement of the Roman army of the decadence. A century and a quarter later—when the Empire of the West had fallen and the general decline had made further progress—Belisarius conducted successful campaigns in Persia, in North Africa, in Sicily, and in Italy. The mere list of countries shows that the mobility and endurance of the Roman forces during a period in which little creditable is generally looked for were not inferior to their discipline and courage. Yet they met with disastrous defeat after all, and at the hands of races which they had more than once proved themselves capable of withstanding. It could not have been because the later Roman equipment was inferior, the organisation less elaborate, or the training less careful than those of their barbarian enemies.

Defeat of the Romans.

Lessons of the Armada.

Though it is held by some in these days that the naval power of Spain in the latter part of the sixteenth century was not really formidable, that does not appear to have been the opinion of contemporaries, whether Spaniards or others. Some English seamen of the time did, indeed, declare their conviction that Philip the Second's navy was not so much to be feared as many of their fellow-countrymen thought; but, in the public opinion of the age, Spain was the greatest, or indeed the one great, naval State. She possessed a more systematically organised navy than any other country having the ocean for a field of action had then, or till long afterwards. Even Genoa and Venice, whose operations, moreover, were restricted to Mediterranean waters, could not have been served by more finished specimens of the naval officer and the man-of-war's-man of the time than a large proportion of the military *personnel* of the regular Spanish fleet. As Basques, Castilians, Catalans, or Aragonese, or all combined, the crews of Spanish fighting ships could look back upon a glorious past. It was no wonder that, by common consent of those who manned it, the title of "Invincible" was informally conferred upon the Armada which, in 1588, sailed for the English Channel. How it fared is a matter of common knowledge. No one could have been more surprised at the result than the gallant officers who led its squadrons.

Other instances.

Spain furnishes another instance of the unexpected overthrow of a military body to which long cohesion and precise organisation were believed to have secured invincibility. The Spanish was considered the "most redoubtable infantry in Europe" till its unexpected defeat at Rocroi. The effects of this defeat were far-reaching. Notwithstanding the bravery of her sons, which has never been open to

question, and, in fact, has always been conspicuous, the military superiority of Spain was broken beyond repair.

In the history of other countries are to be found examples equally instructive. The defeats of Almansa, Brihuega, and Villa-viciosa were nearly contemporary with the victories of Blenheim and Ramillies; and the thousands of British troops compelled to lay down their arms at the first-named belonged to the same service as their fellow-countrymen who so often marched to victory under Marlborough. A striking example of the disappointment which lies in wait for military self-satisfaction was furnished by the defeat of Soubise at Rossbach by Frederick the Great. Before the action the French had not concealed their contempt for their opponent.

British failures.

The service which gloried in the exploits of Anson and of Hawke discerned the approach of the Seven Years' War without misgiving; and the ferocity shown in the treatment of Byng enables us now to measure the surprise caused by the result of the action off Minorca. There were further surprises in store for the English Navy. At the end of the Seven Years' War its reputation for invincibility was generally established. Few, perhaps none, ventured to doubt that, if there were anything like equality between the opposing forces, a meeting between the French and the British fleet could have but one result—viz., the decisive victory of the latter. Experience in the English Channel, on the other side of the Atlantic, and in the Bay of Bengal—during the War of American Independence—roughly upset this flattering anticipation. Yet, in the end, the British Navy came out the unquestioned victor in the struggle: which proves the excellence of its quality. After every allowance is made for the incapacity of the Government, we must suspect that there was something else which so often frustrated the efforts of such a formidable force as the British Navy of the day must essentially have been. On land the surprises were even more mortifying; and it is no exaggeration to say that, a year before it occurred, such an event as the surrender of Burgoyne's army to an imperfectly organised and trained body of provincials would have seemed impossible.

The Prussians at Jena.

The army which Frederick the Great bequeathed to Prussia was universally regarded as the model of efficiency. Its methods were copied in other countries, and foreign officers desiring to excel in their profession made pilgrimages to Berlin and Potsdam to drink of the stream of military knowledge at its source. When it came in contact with the tumultuous array of revolutionary France, the performances of the force that preserved the tradition of the great Frederick were disappointingly wanting in brilliancy. A few years

later it suffered an overwhelming disaster. The Prussian defeat at Jena was serious as a military event; its political effects were of the utmost importance. Yet many who were involved in that disaster took, later on, an effective part in the expulsion of the conquerors from their country, and in settling the history of Europe for nearly half a century at Waterloo.

The French in the Peninsula.

The brilliancy of the exploits of Wellington and the British army in Portugal and Spain has thrown into comparative obscurity that part of the Peninsular War which was waged for years by the French against the Spaniards. Spain, distracted by palace intrigues and political faction, with the flower of her troops in a distant corner of Europe, and several of her most important fortresses in the hands of her assailant, seemed destined to fall an easy and a speedy prey to the foremost military power in the world. The attitude of the invaders made it evident that they believed themselves to be marching to certain victory. Even the British soldiers—of whom there were never many more than 50,000 in the Peninsula, and for some years not half that number—were disdained until they had been encountered. The French arms met with disappointment after disappointment. On one occasion a whole French army, over 18,000 strong, surrendered to a Spanish force, and became prisoners of war. Before the struggle closed there were six marshals of France with nearly 400,000 troops in the Peninsula. The great efforts which these figures indicate were unsuccessful, and the intruders were driven from the country. Yet they were the comrades of the victors of Austerlitz, of Jena, and of Wagram, and part of that mighty organisation which had planted its victorious standards in Berlin and Vienna, held down Prussia like a conquered province, and shattered into fragments the Holy Roman Empire.

Lessons of 1812.

In 1812 the British Navy was at the zenith of its glory. It had not only defeated all its opponents; it had also swept the seas of the fleets of the historic maritime Powers—of Spain, of France, which had absorbed the Italian maritime States, of the Netherlands, of Denmark. Warfare, nearly continuous for eighteen, and uninterrupted for nine years, had transformed the British Navy into an organisation more nearly resembling a permanently maintained force than it had been throughout its previous history. Its long employment in serious hostilities had saved it from some of the failings which the narrow spirit inherent in a close profession is only too sure to foster. It had, however, a confidence—not unjustified by its previous exploits—in its own invincibility. This confidence did not diminish, and was not less ostentatiously exhibited, as its great achievements receded more and more into the past. The new enemy

who now appeared on the farther side of the Atlantic was not considered formidable. In the British Navy there were 145,000 men. In the United States Navy the number of officers, seamen, and marines available for ocean service was less than 4,500—an insignificant numerical addition to the enemies with whom we were already contending. The subsequent increase in the American *personnel* to 18,000 shows the small extent to which it could be considered a "regular" force, its permanent nucleus being overwhelmingly outnumbered by the hastily enrolled additions. Our defeats in the war of 1812 have been greatly exaggerated; but, all the same, they did constitute rebuffs to our naval self-esteem which were highly significant in themselves, and deserve deep attention. Rebuffs of the kind were not confined to the sea service, and at New Orleans our army, which numbered in its ranks soldiers of Busaco, Fuentes de Onoro, and Salamanca, met with a serious defeat.

Defeat of the Austrians, 1866.

When the Austro-Prussian war broke out in 1866, the Austrian Commander-in-Chief, General Benedek, published an order, probably still in the remembrance of many, which officially declared the contempt for the enemy felt in the Imperial army. Even those who perceived that the Prussian forces were not fit subjects of contempt counted with confidence on the victory of the Austrians. Yet the latter never gained a considerable success in their combats with the Prussians; and within a few weeks from the beginning of hostilities the general who had assumed such a lofty tone of superiority in speaking of his foes had to implore his sovereign to make peace to avoid further disasters.

The French in 1870.

At the beginning of the Franco-German war of 1870, the widespread anticipation of French victories was clearly shown by the unanimity with which the journalists of various nationalities illustrated their papers with maps giving the country between the French frontier and Berlin, and omitting the part of France extending to Paris. In less than five weeks from the opening of hostilities events had made it certain that a map of the country to the eastward of Lorraine would be practically useless to a student of the campaign, unless it were to follow the route of the hundreds of thousands of French soldiers who were conveyed to Germany as prisoners of war.

It is to be specially noted that in the above enumeration only contests in which the result was unexpected—unexpected not only by the beaten side, but also by impartial observers—have been specified. In all wars one side or the other is defeated; and it has not been attempted to give a general *résumé* of the history of war. The object has been to show the frequency—in all ages and in all

circumstances of systematic, as distinguished from savage, warfare—of the defeat of the force which by general consent was regarded as certain to win. Now it is obvious that a result so frequently reappearing must have a distinct cause, which is well worth trying to find out. Discovery of the cause may enable us to remove it in the future, and thus prevent results which are likely to be all the more disastrous because they have not been foreseen.

Causes of failure.

Professional military writers—an expression which, as before explained, includes naval—do not help us much in the prosecution of the search which is so eminently desirable. As a rule, they have contrived rather to hide than to bring to light the object sought for. It would be doing them injustice to assume that this has been done with deliberate intention. It is much more likely due to professional bias, which exercises over the minds of members of definitely limited professions incessant and potent domination. When alluding to occurrences included in the enumeration given above, they exhibit signs of a resolve to defend their profession against possible imputations of inefficiency, much more than a desire to get to the root of the matter. This explains the unremitting eagerness of military writers to extol the special qualities developed by long-continued service habits and methods. They are unsleepingly apprehensive of the possibility of credit being given to fighting bodies more loosely organised and less precisely trained in peace time than the body to which they themselves belong.

The danger of "irregulars."

This sensitiveness as to the merits of their particular profession, and impatience of even indirect criticism, are unnecessary. There is nothing in the history of war to show that an untrained force is better than a trained force. On the contrary, all historical evidence is on the other side. In quite as many instances as are presented by the opposite, the forces which put an unexpected end to the military supremacy long possessed by their antagonists were themselves, in the strictest sense of the word, "regulars." The Thebans whom Epaminondas led to victory over the Spartans at Leuctra no more resembled a hasty levy of armed peasants or men imperfectly trained as soldiers than did Napoleon's army which overthrew the Prussians at Jena, or the Germans who defeated the French at Gravelotte and Sedan. Nothing could have been less like an "irregular" force than the fleet with which La Galissonnière beat Byng off Minorca, or the French fleets which, in the War of American Independence, so often disappointed the hopes of the British. The records of war on land and by sea—especially the extracts from them included in the enumeration already given—lend no support to the silly suggestion that efficient defence can be provided for a country by "an untrained

man with a rifle behind a hedge." The truth is that it was not the absence of organisation or training on one side which enabled it to defeat the other. If the beaten side had been elaborately organised and carefully trained, there must have been something bad in its organisation or its methods.

Now this "something bad," this defect—wherever it has disclosed itself—has been enough to neutralise the most splendid courage and the most unselfish devotion. It has been seen that armies and navies the valour of which has never been questioned have been defeated by antagonists sometimes as highly organised as they were, and sometimes much less so. This ought to put us on the track of the cause which has produced an effect so little anticipated. A "regular" permanently embodied or maintained service of fighting men is always likely to develop a spirit of intense professional self-satisfaction. The more highly organised and the more sharply its official frontiers are defined, the more intense is this spirit likely to become. A "close" service of the kind grows restive at outside criticism, and yields more and more to the conviction that no advance in efficiency is possible unless it be the result of suggestions emanating from its own ranks. Its view of things becomes narrower and narrower, whereas efficiency in war demands the very widest view. Ignorant critics call the spirit thus engendered "professional conservatism"; the fact being that change is not objected to—is even welcomed, however frequent it may be, provided only that it is suggested from inside. An immediate result is "unreality and formalism of peace training"—to quote a recent thoughtful military critic.

Professional self-satisfaction.

As the formalism becomes more pronounced, so the unreality increases. The proposer or introducer of a system of organisation of training, or of exercises is often, perhaps usually, capable of distinguishing between the true and the false, the real and the unreal. His successors, the men who continue the execution of his plans, can hardly bring to their work the open mind possessed by the originator; they cannot escape the influence of the methods which have been provided for them ready made, and which they are incessantly engaged in practising. This is not a peculiarity of the military profession in either branch—it extends to nearly every calling; but in the profession specified, which is a service rather than a freely exercised profession, it is more prominent. Human thought always has a tendency to run in grooves, and in military institutions the grooves are purposely made deep, and departure from them rigorously forbidden. All exercises, even those designed to have the widest scope, tend to become mere drill. Each performance produces,

Formalism.

and bequeaths for use on the next occasion, a set of customary methods of execution which are readily adopted by the subsequent performers. There grows up in time a kind of body of customary law governing the execution of peace operations—the principles being peace-operation principles wholly and solely—which law few dare to disobey, and which eventually obtains the sanction of official written regulations. As Scharnhorst, quoted by Baron von der Goltz, said, "We have begun to place the art of war higher than military virtues." The eminent authority who thus expressed himself wrote the words before the great catastrophe of Jena; and, with prophetic insight sharpened by his fear of the menacing tendency of peace-training formalism and unreality, added his conviction that "this has been the ruin of nations from time immemorial."

The fetters of specialism.

Independently of the evidence of history already adduced, it would be reasonable to conclude that the tendency is strengthened and made more menacing when the service in which it prevails becomes more highly specialised. If custom and regulation leave little freedom of action to the individual members of an armed force, the difficulty—sure to be experienced by them—of shaking themselves clear of their fetters when the need for doing so arises is increased. To realise—when peace is broken—the practical conditions of war demands an effort of which the unfettered intelligence alone seems capable. The great majority of successful leaders in war on both elements have not been considerably, or at all, superior in intellectual acuteness to numbers of their fellows; but they have had strength of character, and their minds were not squeezed in a mould into a commonplace and uniform pattern.

Pedantry.

The "canker of a long peace," during recent years at any rate, is not manifested in disuse of arms, but in mistaken methods. For a quarter of a century the civilised world has tended more and more to become a drill-ground, but the spirit dominating it has been that of the pedant. There has been more exercise and less reality. The training, especially of officers, becomes increasingly scholastic. This, and the deterioriation consequent on it, are not merely modern phenomena. They appear in all ages. "The Sword of the Saracens," says Gibbon, "became less formidable when their youth was drawn from the camp to the college." The essence of pedantry is want of originality. It is nourished on imitation. For the pedant to imitate is enough of itself; the suitability of the model is immaterial. Thus military bodies have been ruined by mimicry of foreign arrangements quite inapplicable to the conditions of the mimics' country. Fifteen years ago Sir Henry Maine, speaking of the War of American Independence, said, "Next to their stubborn valour, the chief secret

of the colonists' success was the incapacity of the English generals, trained in the stiff Prussian system soon to perish at Jena, to adapt themselves to new conditions of warfare." He pointed out that the effect of this uncritical imitation of what was foreign was again experienced by men "full of admiration of a newer German system." We may not be able to explain what it is, but, all the same, there does exist something which we call national characteristics. The aim of all training should be to utilise these to the full, not to ignore them. The naval methods of a Continental State with relatively small oceanic interests, or with but a brief experience of securing these, cannot be very applicable to a great maritime State whose chief interests have been on the seas for many years.

How is all this applicable to the ultimate efficiency of the British Navy? It may be allowed that there is a good deal of truth in what has been written above; but it may be said that considerations sententiously presented cannot claim to have much practical value so long as they are absolute and unapplied. The statement cannot be disputed. It is unquestionably necessary to make the application. The changes in naval *matériel*, so often spoken of, introduced within the last fifty years have been rivalled by the changes in the composition of the British Navy. The human element remains in original individual character exactly the same as it always was; but there has been a great change in the opportunities and facilities offered for the development of the faculties most desired in men-of-war's men. All reform—using the word in its true sense of alteration, and not in its strained sense of improvement—has been in the direction of securing perfect uniformity. If we take the particular directly suggested by the word just used, we may remember, almost with astonishment, that there was no British naval uniform for any one below the rank of officer till after 1860. Now, at every inspection, much time is taken up in ascertaining if the narrow tape embroidery on a frock collar is of the regulation width, and if the rows of tape are the proper distance apart. The diameter of a cloth cap is officially defined; and any departure from the regulation number of inches (and fractions of an inch) is as sure of involving punishment as insubordination. The British Navy.

It is the same in greater things. Till 1853—in which year the change came into force—there was no permanent British naval service except the commissioned and warrant officers. Not till several years later did the new "continuous service" men equal half of the bluejacket aggregate. Now, every bluejacket proper serves continuously, and has been in the navy since boyhood. The training of the boys is made uniform; and the training ships are The spirit of uniformity

grouped together under an officer whose duty it is to see that the uniformity is preserved. No member of the ship's company—except a domestic—is now allowed to set foot on board a sea-going ship till he has been put through a training course which is exactly like that through which every other member of his class passes. Even during the comparatively brief period in which young officers entered the Navy by joining the college at Portsmouth, it was only the minority who received the special academic training. Till the establishment of the *Illustrious* training school in 1855, the great majority of officers joined their first ship as individuals from a variety of different and quite independent quarters. Now, every one of them has, as a preliminary condition, to spend a certain time—the same for all—in one single school. Till a much later period, every engineer entered separately. Now, passing through a single training school is obligatory for engineers also.

Within the service there has been repeated formation of distinct branches or "schools," such as the further specialised specialist gunnery and torpedo sections. It was not till 1860 that uniform watch bills, quarter bills, and station bills were introduced, and not till later that their general adoption was made compulsory. Up to that time the internal organisation and discipline of a ship depended on her own officers, it being supposed that capacity to command a ship implied, at least, capacity to distribute and train her crew. The result was a larger scope than is now thought permissible for individual capability. However short-lived some particular drill or exercise may be, however soon it is superseded by another, as long as it lasts the strictest conformity to it is rigorously enforced. Even the number of times that an exercise has to be performed, difference in class of ship or in the nature of the service on which she is employed notwithstanding, is authoritatively laid down. Still more noteworthy, though much less often spoken of than the change in *matériel*, has been the progress of the Navy towards centralisation. Naval duties are now formulated at a desk on shore, and the mode of carrying them out notified to the service in print. All this would have been quite as astonishing to the contemporaries of Nelson or of Exmouth and Codrington as the aspect of a battleship or of a 12-ton breech-loading gun.

Changes not only in *matériel*.

Let it be clearly understood that none of these things has been mentioned with the intention of criticising them either favourably or unfavourably. This is, perhaps, not the place, the present is certainly not the time, for submitting them to criticism. They have been cited in order that it may be seen that the change in naval affairs is by no means one in *matériel* only, and that the transformation in other matters has been stupendous and revolu-

tionary beyond all previous experience. It follows inevitably from this that we shall wage war in future under conditions dissimilar from any hitherto known. In this very fact there lies the making of a great surprise. It will have appeared from the historical statement given above how serious a surprise sometimes turns out to be. Its consequences, always significant, are not unfrequently far-reaching. The question of practical moment is: How are we to guard ourselves against such a surprise? To this a satisfactory answer can be given, though it may be a long one. It might be summarised in the admonitions: abolish over-centralisation; give proper scope to individual capacity and initiative; eschew professional self-sufficiency.

Elimination of individuality.

When closely looked at, it is one of the strangest manifestations of the spirit of modern navies that, though the issues of land warfare are rarely thought instructive, the peace methods of land forces are extensively and eagerly copied by the sea service. The exercises of the parade ground and the barrack square are taken over readily, and so are the parade ground and the barrack square themselves. This may be right. The point is that it is novel, and that a navy into the training of which the innovation has entered must differ considerably from one that was without it and found no need of it during a long course of serious wars. At any rate, no one will deny that parade-ground evolutions and barrack-square drill expressly aim at the elimination of individuality, or just the quality to the possession of which we owe the phenomenon called, in vulgar speech, the "handy man." Habits and sentiments based on a great tradition, and the faculties developed by them are not killed all at once; but innovation in the end annihilates them, and their not having yet entirely disappeared gives no ground for doubting their eventual, and even near, extinction. The aptitudes still universally most prized in the seaman were produced and nourished by practices and under conditions no longer allowed to prevail. Should we lose those aptitudes, are we likely to reach the position in war gained by our predecessors?

Desirability of "taking stock."

For the British Empire the matter is vital: success in maritime war, decisive and overwhelming, is indispensable to our existence. The first year of a century does not differ from any other year, but its arrival does suggest the propriety of reflection. It prompts us to consider the desirability of "taking stock" of our moral, as well as of our material, naval equipment: to ascertain where the accumulated effect of repeated innovations has carried us. The mere fact of completing the investigation will help us to rate at their true value the changes which have been introduced; will show us what to retain, what to reject, and what to substitute. There is no essential

vagueness in these allusions. If they seem vague, it is because the moment for particularising has not yet come. The public opinion of the Navy must first be turned in the right direction. It must be led to question the soundness of the basis on which many present methods rest. Having once begun to do this, we shall find no difficulty in settling, in detail and with precision, what the true elements of naval efficiency are.

CYPRIAN A. G. BRIDGE.

CHAPTER XII.

SOME NOTES ON NAVAL STRATEGY.

Strategy and strategic principles.

THE younger student of naval strategy meets with many difficulties, but one of the greatest, and certainly the most disheartening, is the apparent intangibility of the history of the old wars. Everywhere he is counselled to read naval history, which he does, merely to find that to him its study discloses no strategic laws, that the conduct of our old sea campaigns seems merely the outcome of chance, and the lessons they contain led to no strategic deductions. Then, turning to any military text-book, he finds every campaign elaborated, every move of a general discussed from a strategic standpoint, and judged by laws acknowledged to be unchanging. He therefore is led to the reflection, Why should military operations be so favoured—why should their strategic conduct be so clear, while that of the navy is so hazy and ill defined? With a little consideration we can find three distinct causes for this difficulty—*first*, a confusion of strategy with strategic principles; *secondly*, a want of accurate record of the details of those wars; and, *thirdly*, the enormous difficulties attending the movements of ships in the old sailing days. Every one can appreciate strategic principles—they are few and patent to every layman, but they are not strategy: strategy is the assessment of the existing conditions, and the application of principles to them; the focussing of the military state, the relegation of all events and conditions to their proper perspective, and then the application of principles to movements quantitatively assessed and co-ordinated. And this is where naval history fails to teach the lessons of strategy. We read the pages bereft of the pervading spirit of the times: we do not find there the reasoning of those old salt-besprayed heroes whose sea life and conditions differ so much from ours of to-day. What do we now care strategically for the fresh breeze dying with the sun, with an ebb tide on the make, or the tale of a fleet seen ten days past by a coaster? Strategic principles were then, as now, to destroy the enemy's fleet in the quickest time, and with the least damage to your ships; but their strategy had to forecast the weather and backcast the enemy's

movements. Principles remain the same, but strategy differs. How could history of wars record the hundred and one apparently trivial considerations of wind, weather, and expected gales, strong tides, cranky masts, and rotten canvas?—details which appeared so large and which dictated the strategy adopted: all important to the seaman of those times, but unappreciated to-day. History chiefly records the pruned fact, which looks so simple, though the reason perhaps seems incomprehensible, but not the conflicting interests and evidences of the occasion. It is the absence of these details that robs the history of naval operations of half their value. Had we verbatim accounts of every council of war, how the master mind would shine, and, while teaching us the bold illumination of world-famed principles, would show us the limiting factors which necessitated the resulting actions! Without the smell of the salt and the mist of the night, without the every detail of the particular undertaking, the spirit of the body is absent, and we must be content to discuss historical naval strategy more from the point of view of the dissection of a corpse than the examination of a living body, and we must be content with the rattle of dry bones where we would seek the secrets of the brain. Hence the intangibility of the history of old naval wars to the student of naval strategy. No rules were made or followed, nothing but example handed from generation to generation; and the strategic conduct of the naval combinations and movements by Nelson even appears rather to have been an accurately assessed commonsense view of the existing political naval and military conditions, and of the resources of his own country and of those of the enemy, which his genius guided into the right line of action, than any formulated rules or definite deductions which would form the axioms of naval strategy. The reason for this is not difficult to find: it lay in the helplessness of the sailor to move from place to place with any regularity as regards time of passage. He was powerless to do more than beat to windward, or perhaps "lay to," when his consuming anxiety was to be two hundred miles to windward—every disposition, every plan, lay at the mercy of wind and weather.

Intangibility of naval strategy.

This utter unreliability of locomotion prevented any of the niceties of combinations which ashore military leaders were employing and studying. Now this has all changed: we find ourselves capable of moving ships or fleets for hundreds of miles with absolute accuracy. We have outstripped military movements both in speed and certainty. Our enemies on the sea are able to change position with bewildering rapidity, and if we turn in vain to our only handbook, the History of the Old Wars, for guidance in details, we are disappointed. True it

is that the main principles of control of the sea, the value of sea-power, the sacrifice of the individual to the furthering of the whole campaign—true it is that main principles like these run like a steel stay through naval history, from the trireme to the battleship, but the remainder of the structure has altered. Undoubtedly it will be found a great help to study military history and strategy, adapting and assimilating their teaching to sea conditions; in them we have centuries of experience and principles that have stood the test of a hundred campaigns. For this reason the study of naval and military history and of the standard works of military strategy should be the groundwork of the study of naval strategy.

Strategy and tactics. The art of war has two broad divisions—strategy and tactics. All operations come under one or the other of these two heads. Strategy is the science of conducting the war, forming combinations, and disposing them when not in contact with the enemy's forces, whereas the science of tactics governs the actual disposition of the units of the combinations, both as regards each other and the enemy. The problem of strategy is to form and place the best combinations, having regard to the numbers and distribution of the enemy, and the probable outcome of the ensuing engagement. The problem of tactics is how best to use the units of the combinations in the face of the enemy. Strategy therefore must be dependent on the probable result of the equipment, material and moral, of the units, and also on the tactics of the battlefield.

Their inter-dependence. Strategy and tactics are therefore dependent one on the other. The disposal of force should take into account, as far as possible, the tactical capacity of the admiral or general, so as if possible to compensate the poorer tactician by the larger force. In the naval wars of the early part of the century superiority in training and discipline allowed our fleets to engage others of considerably superior numbers. There is no apparent reason why this should be the case now. But that a good tactician, opposed to an inferior one, is capable of engaging with fewer ships is still an axiom of warfare.

Strategy has two broad divisions—the strategy of peace time, and the strategy of war. The strategy of peace time aims at preparedness for war; the preparedness of ships and keeping them and their armament up to date; instruction and employment of officers and men to keep them in a state of efficiency; diplomatic action, whereby the best strategic points are secured and suitably fortified, and the least wanted bartered for other more useful rights; the cultivation of friendly ties with nations whose ports would be of use in war time, and whose shores flank our trade routes; the collection of intelligence respecting foreign countries, their changes in war material,

and the fortification of their bases; the position, and change of position, of their ships; the selection of the ships to serve on each station, having regard to the capabilities of that station to maintain and refit them, and their tactical value compared with that of those of other countries on, or available for, the same station; the formation of reserves to fill vacancies caused by losses or disablement in the fleets; the maturing of plans of campaign in the event of all possible foreign combinations.

The Strategy of War.

Condition of a victorious fleet after an action.

The main object of a naval war is the destruction of the opposing fleet: all other operations are of secondary importance. Until the enemy's fleet has been disposed of, other operations cannot be undertaken with safety. The object of strategy is to do this with the least possible loss to your own fleet—but at all events to do it. The conditions underlying this consideration are very important, and in some respects differ radically from those of former naval wars, and of present military undertakings. If a naval engagement takes place, damage must be done to both sides, to the stronger as well as to the weaker fleet. And the important strategic question arises as to the extent of the damage a strong fleet will receive when fighting one considerably inferior. Supposing the weaker fleet annihilated—that is, sunk or useless scrap iron, in what condition will the surviving fleet be left? Will it be able immediately to fight again? or will its secondary armament, as well as the more or less exposed adjuncts of control and communication, be so damaged as practically to necessitate immediate and lengthy repairs? It is on this question that the whole conduct of offensive and defensive strategy hinges—whether it is advantageous to fight an enemy in detail or after concentration, whether an enemy should be engaged with equal or fewer numbers, and the balance of ships kept as a reserve for future use, or whether the whole should be employed in the attempt to crush the enemy. In olden times the question never could arise: concentration and larger numbers were the keynote of success. But we must remember that then repairs after an action were easily effected—a few holes to stop, jury masts to rig, sails to repair, and the ship was again ready for the fray. Also the tactics of those days were mere bow and arrow play compared with the possibilities of the present. The possible tactics were mere crudities of using existing wind: the forces now available are immense, and the absolute control of direction and speed only requires the master mind, transmission of orders, and practised manœuvring to make it perfect. True it is, in this day as in olden times, that a ship can be looked

on, not as capable of doing a certain amount of damage, but a certain decreasing amount per minute, and therefore the greater the gunfire directed against her the fewer the minutes and the higher the rate of decrease of that damaging power. But balancing against this the unwieldiness of a large fleet, its want of coherence if composed of different nationalities, together with the numerous tactical considerations which are out of the scope of these notes, and which, moreover, it is highly undesirable to discuss, we are faced by the question whether superiority in numbers has a similar bearing on strategy now as in olden days, whether, in fact, leaving out, of course, crushing superiority, a fleet superior before an action is after it "a fleet in being."

The control of the fleets strategically is in the hands of the central body in the home Government, by whom the general plans and original dispositions are communicated to the admirals. This control would always be kept as long as communication could be maintained with them: when communication is severed, the control devolves on the admirals commanding. Communication between the central authorities and the fleet is maintained by telegraph cables and despatches. The telegraph cables are the most rapid, but are open to attempts to destroy them, and are unsuited to lengthy communications involving much detail. Hence written communications may often have to be sent by vessels. These vessels proceed to rendezvous from whence communication is kept up with the fleet. When communication with the central body is disturbed, or when immediate action is necessary, the admiral acts on his own initiative, informing if possible all officers in command of other fleets whose actions his movements may affect.

Offensive strategy.

The strategy of war is broadly divided into two classes—offensive and defensive. *Offensive strategy* has for its aim the command of the sea, and has as a main objective the destruction of the opposing fleet. *Defensive strategy* aims at preventing the opposing fleet obtaining the command of the sea by preserving a sufficient sea force intact and capable of movement and concentration, keeping the enemy's forces intent on its possible employment, and therefore limiting their offensive and military actions. Offensive strategy includes three series of operations.

First.—Keeping fleets of sufficient strength always opposed to those of the enemy, and seeking out and fighting the enemy wherever possible: this necessitates the observation of all bases or other positions where the enemy's ships may be found, communicating to the fleet all information respecting their movements, and concentrating the battle squadrons at positions on interior lines, so as to

be superior to the squadrons attempting a junction. *Secondly.*—A blockade of the enemy's commercial ports, the capture of his merchant shipping and of the enemy's property on the high seas, and the seizure of all contraband of war. *Lastly.*—Offensive expeditions against such of his possessions as are open to military invasion. This last can only be done when his fleets are so crippled or contained as to make it impossible for him to disturb the lines of communication.

Definitions. Bases.

It will be as well here to discuss exactly what we mean by the various names strategically applied to geographical positions—bases, lines of communications, theatre of operations, and strategic positions. The sole use of naval bases is for the assistance and maintenance of the fleet, and therefore any classification should deal with their usefulness in this capacity, while their fortification or garrisoning by military forces should be dependent solely on this function. Consequently we will divide them into three classes:—

Primary bases are those largely independent of the fleet—that is, situated in a territory to a great extent capable of self-support. To this class belong large naval arsenals in the home ports, with wide tracts of friendly country in their rear, and a large coast line to gather supplies that have to be imported, and naval arsenals or defended harbours in colonies not themselves dependent on imports for mere existence or the supply of the fleet. This class is in no way directly dependent on the fleet for existence. The fleet opposed to the enemy, perhaps many hundreds of miles away, occupies the enemy's attention, absorbs his energy and strength, and leaves the base safe from invasion, while its own fortifications are sufficient to drive off spasmodic raiders who might attempt to shell the arsenal and damage the permanent works. Indirectly, therefore, they are defended by the fleet, but not directly so.

Secondary bases are those which, while affording supplies and facilities for docking and repairs, are dependent on sea transport for the replenishment of stores and repairing material, as well as for provisions for the population. These again require fortifications to repel a raid; the fleet is their insurance against invasion, but they rely directly on the fleet to keep up their line of communication with a main base, so as fully to perform their duty towards the fleet. Malta is an example of such a base.

Tertiary or temporary bases are geographical localities used by ships to effect repairs or replenish stores, but in themselves are not large depôts, and do not provide docks or factories for repairs. They therefore require no permanent fortifications, or only those of the most elementary nature. They may equally well be a latitude or

longitude at sea, when their use is considerably reduced by conditions of swell or weather, or harbours where ships may anchor independent of such uncertainties, where, with the light defences of the place and their own appliances, they can, if necessary, guard against torpedo attack. Wei-hai-wei is an example of such a base.

Coaling bases must be included under this head. They should be situated in long lines of communication, and have sufficient fortification to withstand such minor sea operations as are likely to be directed against them.

Lines of communication. Lines of communication of a naval Power are the high seas. These normally belong to both belligerents. Their possession by one belligerent may be obtained in the following ways:—

1. The destruction of the enemy's battle fleets, or containing those fleets by superior or equal squadrons.
2. Similar action as regards his cruisers accompanied by destruction of his bases, so as largely to reduce their radius of action.

The destruction of the enemy's battle fleet leaves the oceans free for any operations, the transport of any troops, or the occupation and creation of any base covered by the victorious battle fleet; while it leaves the enemy powerless to act against or in the neighbourhood of such a fleet, or in waters covered by it.

When the enemy's fleets are contained by careful watch off a harbour in communication with a largely superior fleet, the enemy is deterred from undertaking any offensive action by the knowledge of the close proximity of the containing fleet, which can pursue his fleet at once should it manage to escape, and which is ready, should any other operations be conducted, to turn and destroy any transports or vessels that may be employed on such an undertaking.

But should the containing power have sufficient surplus battleships to cover additional operations that may be desirable, such as the destruction, siege, and capture of his secondary, and occupation of any temporary, bases, the destruction of such bases would largely constrict the sphere of the enemy's cruisers' action, and curtail their power of raiding his commerce, as well as subsequently reduce the risk to his military sea transport.

If, therefore, a belligerent loses the power of using his lines of communication the results are fourfold.

1. His outlying fleets are cut off from their main supplies of ammunition, stores, and men. They may exist from supplies that are indigenous to or are stored in secondary bases, with which communication may still be kept up, but the main supply is lost.

2. His secondary bases are thrown on their own resources, and have to become self-supporting as regards supplies of men and material, their imports being *ipso facto* intercepted.

3. His secondary bases are open to military attack and reduction: this also applies to all his foreign possessions.

4. His own imports and exports are cut off from sea transport.

Theatres of operations.

The larger theatres of operations will probably be those seas on whose shores either belligerent has territory, since most probably the sea communications of any territory will be guarded by the ships of war of the possessors, and the adjoining seas held to prevent armed forces being transported to attempt military occupation. The different theatres of operations will vary in the extent of their interest to the belligerents, and the number of ships engaged. They may be summarised as follows in the order of their value:—

1. The seas adjoining the coasts of the two belligerents.

2. The seas where either belligerent has territory open to invasion by small forces and incapable of prolonged self-support.

3. The trade routes of the belligerents.

4. The seas adjoining territory belonging to either belligerent, this territory being capable of self-support.

5. The seas where either belligerent has interests but no territory.

Each theatre of operations must have bases, of which at least one should afford shelter and protection to the fleet.

Strategic positions.

Strategic positions are any localities that form suitable places for ships to cover the possible action of an enemy: they need not be harbours, but are often merely a latitude and longitude. Calder's position one hundred miles west of Finisterre, Nelson's cruising ground covering Cadiz and the Straits of Gibraltar, are two excellent examples of such positions.

Defensive strategy.

The defensive strategy of a navy may best be defined as the policy of delay; its object being to prevent the adversary obtaining command of the sea, while itself too weak to obtain it. It would constantly be undertaken by a weaker fleet while waiting to effect a junction or to receive reinforcements, or while using its small craft to reduce the numbers of the enemy's fleet. It, if anything, necessitates more activity on the part of the cruisers, and smaller vessels, than an offensive strategy. Its aims are to force the enemy to divide his fleets, to contain several different points, and at the same time to keep him in constant fear of offensive action against his battleships; to use fast craft to reduce the numbers of his battle fleet, to fight chiefly against battleships and reduce their number, at the same time never engaging any large ships unless they can crush their opponents with but small damage to themselves. It is the combination of a guerilla

and predatory warfare against battleships with the art of maintaining and using the potent threat of a fleet in being.

A defensive strategy, like all evasive movements, is bad for the morale of the fleet; also, from frequent lengthy stays in harbour, it is bad for the sea-going efficiency and practice of the battleships. On the other hand, it stimulates the action of smaller vessels.

Although offensive and defensive strategy are more generally considered as applying to the dispositions of the whole of the forces of a country, yet it may often happen that ships of the same country may temporarily be conducting a defensive strategy in one theatre of operations, and an offensive in another. Also that the arrival of reinforcements, or the accidents of war, may cause the admiral in any particular theatre of operations to assume a different strategy. It is therefore necessary attentively to consider the principles of both classes of operations, and not neglect the study of the defensive, because our navy as a whole is stronger at present than any other.

Local potency of the defensive.

For a largely inferior belligerent, who is compelled to take the defensive against his superior, the chances are slight of preventing his opponent commanding the sea, and therefore his trade and foreign possessions. But to a force temporarily inferior the defensive well conducted is of enormous value; to strike quickly with his force concentrated against the enemy's smaller squadrons; to force the opponent to divide his forces and then to concentrate and attack them in detail; to raid his fleets by every fast vessel available, using every means to destroy any large vessel of the enemy, at whatever cost to the small craft; in fact, to fix his whole energy on the destruction of ships in detail, and attempt to reduce the enemy's fleet to such numbers as to render uncertain his control of the sea, or to reduce his fleet power to an equality; to be always moving, or attempting to move, always trying the unexpected, striking everywhere with energy, and forcing the enemy's attention on the action of your ships, and distracting it from ulterior objects; never attempting any other operations than the destruction of the enemy's ships; never risking damaging the fleet to such an extent as to destroy its attribute of being "in being." These are the most obvious principles of a defensive strategy.

Identity of naval and military strategical principles.

Having now considered the principal terms and operations, we will turn our attention to the comparison of the main points of strategic operations as affecting the army and navy. At first the nature of the arms employed, the physical differences of the theatres of war, the enormous difference in the transport, and of time of movement of the units—all seem to point to great variations in both the strategy and tactics of the two sister services. The power

possessed by a fleet of being self-contained and able to traverse long distances without lines of communication, and also of such a fleet having nothing apparently analogous to the flank of an army, seem at first sight to necessitate a great departure from strategy as practised ashore. On closer examination, although the comparison of tactics must fail, the principles of strategy will be found the same—in fact, identical. So much so is this the case that a fleet, besides being able to fight a fleet, can fight and has fought, both in conjunction with and strategically against, armies ashore. It is only necessary to recall Napoleon's Continental system, when armed Europe, obeying his every command, fought strategically against our fleet, and our fleet only, in our adoption of what might be called in contradistinction the Oceanic system. For months the war continued purely strategic, no actions, no collision, but each with a grip on the vitals of the other, till exhaustion pronounced in favour of the British. This is, perhaps, the most conclusive example of the identity of naval and military strategy, and of the only ground on which the two arms can meet and, by endurance, fight to the bitter end.

A comparison.

Now, to examine more minutely the similarity in strategy of the two forces, let us follow the broad outlines of the course of a war as conducted by an army and a fleet. An army, according to circumstances, acts either on the offensive or on the defensive. Having in view the object of the operations, the general will select an objective. When near the enemy's forces he will, if possible, attack them, but if the enemy refuses action they must retreat. If there is a battle, and the invading army is victorious, the other must retire towards its base to reinforce. If the enemy is unable to offer further resistance before the objective is reached, the advancing army will seize the objective or, if fortified, lay siege to it. If unable to advance while the siege is proceeding, it will take up a strategic position covering the siege. Similar operations will continue till the armies have met and a decisive engagement or engagements have taken place which render the enemy unable to collect a sufficient force to oppose the victorious army. The head centres of administration and government can then be seized, and social and legislative disorganisation must ensue, stifling reorganisation and resistance.

In a naval war, having undertaken offensive action, the Admiral seeks the enemy's fleet: this must engage him, or retire into fortified harbours and take up a purely defensive strategy. If the enemy fights and is worsted, he must do the same, to repair his damages and wait reinforcements, until once more he is in a position to undertake offensive action, or attempt a junction with his relieving force. During the time of his remaining in port his sea commerce, exports

and imports, fall into the enemy's hands, and complete intercourse with possessions separated by sea is cut off. If the inferior power is unable to assert an equality or superiority on the sea, then the country must make peace to avoid the annihilation of certain industries and loss of capital to the nation, as well as to save any colonies which are not self-supporting and able to resist occupation. These bald outlines of the general course of a naval and military war are very incomplete, but the factors mentioned are the same, and lead to the same result in each case. To amplify the above we will consider the case of each country possessing territory in different seas. Then the theatre of war becomes the ocean, and each sea in which the countries have possessions becomes a theatre of operations. Again, the ultimate objective is the same: the control of the highways of the sea by destruction of the main fleets of the enemy, or forcing them to assume a defensive rôle and to quit active operations on the sea. Battles may go on perhaps with varying success to the two sides in the minor theatres of operations, but ultimately success must lie with the fleet whose main communications for despatch of relief ships, warlike stores, and troops are rendered safe by the practical effacement of the opposing vessels. To this scattered warfare over the remote corners of the ocean we have a complete analogy in the Napoleonic wars of the opening years of last century. The allies scattered round the frontiers of France engaged the troops of Napoleon in two or three quarters at once. So long as his line of communication was safe he could conquer and hold all these; but eventually, owing to the exhaustion of France, his line of communications to wealth and to his reserves became longer; became of necessity the paths of the sea, for his trade to pass to other countries, and to his lost colonies; for him to receive the gold for his industries and those stores he so much needed. These the British fleet held. Napoleonic Europe became an island, bordered by the sea and the deserts of Russia. Cut off from supplies and with his industries crippled, the death-grip of the English fleets on his communications slowly starved him to his doom.

The defensive and the "fleet in being."

Offensive strategy for the army and navy is therefore, as we have seen, broadly governed by the same principles, but with defensive strategy a different condition arises in the navy distinguished by the term "fleet in being." This term, taken from Lord Torrington's despatch after the battle of Beachy Head, has lately come into general use. It may seem strange that a term so conveniently expressing a condition of power of a fleet should have had no counterpart for over two hundred years. It must, however, be remembered that it is only of late years that naval strategy has received scientific treatment, and

has had terms and definitions applied to its operations. With the growth of careful analysis this happy, lucid, and graphic expression "fleet in being" has been applied to conditions which require many sentences thoroughly to explain. It will now be well to compare the state implied by this term with corresponding military conditions. This is, however, not easy, since military operations do not usually cover ulterior objectives, not themselves of a military nature, in the way that naval supremacy is a prelude to military operations across the sea. In fact, the whole object of military action is to seize and hold the enemy's country and force him to terms; while naval offence can never of itself accomplish this, it requires entirely separate assistance and operations. If ashore an army refuses to fight, the enemy's territory is invaded and he is forced to terms, while at sea the most direct injury supremacy of itself can immediately accomplish, is the capture of his sea-borne property and the taking of such distant possessions as are incapable of resistance. In the ordinary defensive strategy on shore the army acting on the defensive is not an "army in being": it is an army continually fighting, and resisting the progress of the invader, making use of physical advantages offered by the country for effectively doing so. If it remained passively inactive it could be surrounded and starved, and with a superior army across its communications would, if unable to prevent the occupation and absorption of its territory, have no potential worth. But at sea a fleet unable to undertake the dispute of actual supremacy cannot be surrounded by its adversary, if it retires into a well-defended harbour on the coast of a country from which it can draw supplies: it is in a position analogous to an army in a fortified sea-port who can draw supplies from sea traffic. Since, therefore, the fleet cannot be surrounded and starved into surrender, but on the other hand is always ready to put to sea if required, it remains a threat to the subsequent secondary operations of invasion, although its inactivity may meanwhile lose the nation its sea commerce. An uncontained enemy appearing on the flank of the lines of communication of a superior army would temporarily exert the same control over the strategy of that army that a fleet in being possesses in a naval campaign. To select one special instance. Sir John Moore's famous march from Lisbon to Corunna is an excellent example of the strategic effect of armed force "in being." His army was so inferior that if compelled to fight he would have risked annihilation, and therefore have laid the territory he defended at the mercy of the enemy. By his brilliant march his army became an "army in being," threatened the communications of Napoleon, and by strategy rather than by fighting saved Portugal by compelling the whole of the opposed

army deliberately to discard its objective and retrace its steps. The comparison is all the more complete since he had a base to retreat to, to which Napoleon could not follow him, and which he reached with the aid of a successful action. His object had been attained, Napoleon returned to France, and Portugal was saved. Let us note that it is entirely the combination of land and water that permits of a force, either naval or military, being "in being." Guerilla warfare, again, is a degenerate form of vessels "in being," and has its counterpart in the raids of small craft on a superior fleet. Ashore, without concentration and organisation, such warfare can have little final control over military operations; since the damage done is slight and not lasting, and it may often happen, as lately in South Africa, that prisoners of war taken cannot be retained. But at sea the conditions are different: every battleship torpedoed is a battleship lost, and, therefore, such warfare is of great importance. Again, ashore such warfare is carried on by parties, composed of the same fighting units that form main armies, but which, if combined, would not form an army comparable in numbers with the enemy's forces. This condition is therefore usually met with after main bodies have been beaten and reduced. Afloat it is entirely different. No combination of small craft can produce the tactical qualities of a battleship; nor is a battleship capable of subdivision—this warfare is carried on by a distinct type of vessel. The result is, that at sea guerilla warfare will precede the larger engagements, and will be a means of accomplishing the equality of the fleets before their actual encounter. In these days, therefore, such warfare increases the chances of final success of the passive strategy of a "fleet in being."

The factor of naval mobility.

So far the broad outlines of strategic operations have been the same for each service. But when we leave mere principles, and come to consider the strategic operations due to the physical features of a geographical area, we must necessarily find considerable modification necessary, chiefly owing to the enormously increased rate of travel of ships compared with armies; and the sameness of the sea providing no physical advantages or disadvantages to either force. A battleship squadron has no line of communications when proceeding from base to base. It is analogous to a flying column ashore—it is self-contained. When on the warpath its movements are unhampered by communications; but the intercommunication of its bases must, within limits, be assured. Again, there is no such thing as fatigue, nor is rest from motion required to a fleet, within the limits of its coal endurance. For these two reasons a naval force is extremely mobile, and strategic alterations in disposition can be made with far greater rapidity and secrecy than is possible ashore. The extent of

such alterations, again, is immense. A fleet disappearing in China might turn up with equal ease in Australia, or the Pacific coast of America, or in the East Indies. The force from one theatre of operations might change its position to another, and effect a junction with a fleet there, with astounding secrecy and rapidity. The limitations to such movements ashore are physical obstructions, muscular weariness, and transport; afloat, the limitation is coal consideration. This gives rise to principles which, for want of a better name, must be called *coal strategy*. If ashore a soldier be given four days' rations to consume in one he will probably go half as fast that day; at sea, ships go twice the speed. We have, at sea, command of very high speeds, but we pay a ruinous price for the luxury. Provided we have the choice of speed we can steam long distances, but if we are hustled, if desire of evasion or other dire necessity increases our rate of travel, we draw heavily on the distance we can steam. A fleet with many coal bases can, therefore, hustle another into inability to proceed to other than certain destinations—without overtaking or forcing a general action we can, to use an "Irishism," head off the fleet from astern. This limitation of distance capacity, this invisible control over the destination of an enemy, is a point worthy of great consideration, since it gives a new meaning to the word blockade, it confers new powers on a superior fleet in touch with, but out of sight of, an enemy. Nor is it in strategy only that the question of coal and its supply have place; tactics, at times, may largely be dictated by coal considerations, but this is beyond the present question. It may be suggested that supplies of coal should always be carried with a fleet. Food for the soldiers is carried by the commissariat: why not carry food for the ships, in suitable vessels, so as to replenish their bunkers when required? That coal can be carried with a fleet and distributed under certain conditions is obvious, but to count upon such a supply as being generally possible, and to place reliance on such replenishment being always available, is quite out of the question. That ships will, on occasions, have their bunkers filled at sea is probable, and even at times a necessity, but the possibility of such replenishment must not be looked on as a general operation of war time. To appreciate this fully, let us compare the feeding of bunkers with the feeding of troops, and consider the transport required, and the subsequent disposal of that transport, as well as the time available for distributing the coal, and the localities where such distribution is possible. On all these points we shall find greater difficulties attending the supply of coal than that of provisions ashore. First of all, the rate of transport must be equal to the speed of the fleet;

Coal strategy.

Its importance.

consequently the coal consumption of the colliers will be comparable with that of a man-of-war of equal tonnage. To make her own coal consumption negligible compared with her carrying capacity the collier must be very large; but a very large collier is inconvenient to coal from, even in close harbours. The difficulty, again, of the disposal of colliers after use has to be considered: either they must steam under convoy, or at a high speed, to some base, which necessitates the use of coal, or they must remain with the fleet and keep coal equal to that possessed by a ship of the fleet. Both these difficulties are analogous to the porterage of water with a column in a country where none is available, when the carriers themselves have to drink of the actual loads they are carrying, and as each man's load is finished he becomes useless and wasteful to the column. Then, either the range of action of the column is limited, or they must be sent back to the base. All who have had to deal with this class of self-wasting porterage know that its employment is only practicable under dire necessity, and is always a matter of difficulty and of incipient danger. In addition to these two conditions, we have two others to take into consideration—namely, the waste of time in distributing the coal, and the difficulty of finding a suitable place when it may be required to effect the coaling. These have no counterpart in land operations, where the daily bivouac supplies both; but at sea, to coal a large fleet from colliers of requisite size to be averagely economical would either entail a very large number of such vessels, or occupy a great time, and, moreover, a time entirely lost to the operations in view, and perhaps not incurred by the opposing fleet. The difficulty of suitable position for the operation precludes the attempt in certain waters, while in others convenient places may be relied on; this condition is entirely meteorological and geographical. The separate difficulties of each of the above considerations apply to special and different conditions: it is therefore impossible to integrate and say generally that coaling at sea is possible or impossible, but it is quite safe to predict that there are occasions when coaling at sea will be systematically carried out, and that as assuredly others exist under which it will be extremely rash to put any reliance in the possibility of such an undertaking. Maintenance of coal supply, either by economy or replenishment, is as strategically important to the navy as commissariat is to an army in the field; the difficulties of maintaining the supply and the dangers in case of failure are equally grave. Moreover, let us remember that, although hundreds of years of experience have ground this danger into military thought and disposition, with the navy it is the mushroom growth of yesterday, and no experience in past wars exists to warn us of risking failure

Strategic incidence of coal supply.

from this cause. Careful thought, and analogy soundly applied, are our only helps. The lessons to be learned from the failure of competent forecast lie in the naval wars of the future.

Advantages and disadvantages of physical conditions.

Dealing with the absence of physical advantage and disadvantages, we find the sea one vast tract; no limitation due to width of roads, no bridges exist, and exceedingly few passes, and these mostly of such a size as to render it possible for a fleet to traverse them unobserved by night or in thick weather. The result is that all strategico-tactical operations, such as scouting, reconnaissance, or rearguard actions, are rendered extremely difficult. We have only, in place of these physical obstructions, the alternations of light and darkness. These diurnal changes are of great importance, for, although not directly reducing the travelling power of a fleet, they absolutely limit visibility, and therefore efficiency of scouting. Also, the fact that the destructive value of certain vessels depends solely on the screen afforded by such darkness, and that they rely on nightfall for the full exercise of their function, renders this period one of danger, and imposes the utmost caution on the movements of a fleet. The rearguards of a fleet do not, like those of an army ashore, look for help from ranges of hills, passes, or natural barriers on which to rest and gain an advantage of position, but from the covering cloak of darkness fully developing the offensive value of the small craft, by, in like ratio, reducing the defensive powers of the larger vessels. But the effect of alternations of light and darkness on strategic-tactics is far too large a subject to do more than mention in these notes. Its effect is marked on every page of naval history, but of late years its potency has increased in direct proportion with the facilities and improvements of the age.

Regarding the strategico-tactical portion of a campaign, a naval theatre of war would compare with a military one consisting of a huge irregularly shaped plain bounded by water, with fortresses on the shore—this plain traversed by flying columns able to move to their visible horizon in half an hour. Fog, rain, and long hours of darkness are the principal varying factors, and when associated with great speed of movement are paralysing obstacles to scouting and observation.

Lessons of the defence of Natal.

Probably the most interesting lesson that the war in South Africa has afforded to the student of naval strategy is the defensive strategy of the troops under Sir George White in Natal; and it will perhaps not be without interest to examine the naval analogy to the military operations. The problem consisted of a force preventing an enemy of three times its number overrunning a geographical area and attacking and holding its sea base. Briefly

this was effected by intrenching the defending force in a position on the direct route of the enemy, and forcing him to one of two operations—either investing and reducing the intrenchments, or containing the garrison by investment with a sufficient force and advancing to further offensive operations with the remainder. The naval comparison would be that of a temporarily inferior fleet attempting to hold the seas of a station in the presence of a superior force of greater speed and mobility than itself. In both cases the inferior force must seek the protection of a fortified base, and become a threat to the communications, unless thoroughly invested and contained. The offensive admiral is bound to invest the fortified base with a superior number of ships before proceeding, should he think it advisable, with the reduction of the main objective by combined naval and military attack. An analogous operation would be for a temporarily weak Mediterranean fleet to attempt to prevent an invasion of Egypt from the westward. By seeking refuge in Malta on the line of communications the fleet becomes a threat, and awaits a relieving squadron. The superior fleet is bound to invest the island, and could with the remainder of his ships escort troops to the objective. The main consideration is the same in each case—namely, absolute power to control the line of communication and therefore a safe line of retreat, together with thorough ability to intercept reinforcements for the contained force. In the case of Ladysmith the contained force absolutely broke the railroad communication, so that transport was required other than by train for at least four miles. In the case of Malta, that island lies in the main road of the traffic. The power of the blockaded fleet to raid the containing force both by ships and small craft, if it remains in the vicinity of the island at night time, might lead to such a diminution of the blockaders' numbers, especially after a successful night action, that the two fleets might be reduced to equal strength, and the whole line of communications and retreat placed at the mercy of the blockaded fleet. At all events, fast cruisers escaping during suitable weather should work havoc on the lines of communications. With all these factors against the stronger fleet it is doubtful if any admiral would, under the condition, attempt offensive action, unless the number of his ships was overwhelming; and even then he has the factor of reinforcements to provide against. In fact, the whole question of the outcome of the struggle would be in the possibility of the reinforcement and relief of the contained fleet. The potential threat of the fleet, accentuated by the knowledge of reinforcements about to start to attempt its relief, would paralyse useful offensive operations on the enemy's part. It appears, therefore, that in broad

Malta and Egypt—an analogy.

principle the strategy of a fleet under the conditions supposed—namely, in an island harbour fortified and provisioned beforehand, is not only merely similar, but identical with that of our gallant troops in Ladysmith. But now that we have arrived at the question of the relief of such a force, it is less easy to draw any further parallel. That the strategy ashore must be for the containing force to concentrate and defeat the reinforcements, and then try conclusions with the contained, is evident; but from the naval side the result, even if the reinforcements are beaten, is open to grave doubt. The crucial question is, How far can a fleet, after a successful engagement with an inferior one, be fit to engage another arriving fresh for the fray? We are now not merely dealing with bodies of men who, exhilarated by a victory, are ready to gain another. We pass from pluck to prosaic matter, steel and iron, guns and engines. Leaving out all questions of actual damage to guns and communication, dirty fires, unswept tubes, joints leaky from concussion of shell, must place them at a disadvantage; and it is a question of some gravity whether the majority of ships, after an action, could engage a fresh squadron. Ashore companies can be filled up and other combinations of troops readjusted; but a ship is an entirety, incapable of subdivision or agglomeration.

Strategic alternatives.

The question of when a fleet should engage another and when it should refuse to fight is one of the strategy of the whole campaign. An admiral should be no more afraid to refuse to fight, should strategy demand such a course, than he should be afraid to engage the enemy. The only sure guide is for him to leave his own inclinations entirely out of the question, to remember that his force is only a portion of the whole and the sole object he should have in view is the furtherance of the whole campaign. Cases may often arise when an inferior squadron should attack and fight a superior, doing all the damage it can, though itself suffering defeat, should the urgency of the case demand the practical disablement of the enemy's ships. But, on the other hand, many conditions may exist when an inferior squadron should use every endeavour to avoid an action. Nor is it always the duty of a superior squadron to engage an inferior, if in so doing, even though achieving a temporary gain, it incurs ultimate strategic loss. Villeneuve's avoidance of Nelson in the attempted concentration in the West Indies must not be viewed in the same light as Byng's failure thoroughly to engage off Minorca. Nor should the strategic principles governing Sir John Jervis's action off Cape St. Vincent be confused with those determining Lord Torrington's inaction at Beachy Head. Each case requires the special consideration of the principles involved, and it may happen that the engagement of a stronger squadron with

an inferior may be as strategically unsound as, under certain conditions, the refusal of an inferior to engage a superior. Personal and public sentiment are factors which make, in exceptional cases, a sound strategy hard to pursue.

Although the discussion of tactics is quite outside the scope of these few notes on strategy, still it may not be out of place to remark that with strategic-tactics comparison between naval and military operations ends. Between naval and military tactics there is no similarity; the fighting units and arms employed are too different for analogy to exist. If ever the day arrives when armoured traction engines may transport and shield troops, then the disposition of brigades of tractions in echelon may resemble columns in quarter line disposed abeam. But by that day it is quite possible that the enormous warships of the present day may have undergone subdivision into crowds of small fast craft, which, in turn, would have to assume organisation resembling that of present-day battalions.

Changes in strategy.

We have briefly sketched the similarity of strategic principles in their application to both navy and army, and also similarity in some of the strategic operations, but there still remains one great lesson running through history from the time of Goliath of Gath to the present century, and that is that change of arms and change of facilities, in fact changes in any of the data of warfare, necessitate corresponding changes in strategy. This broad lesson is one on which too much stress cannot be laid. In our early military wars, when armies fed on the produce of the invaded countries, and lines of communication were unknown, strategy included none of its finest problems, which deal with the threatening or maintenance of these all-important sinews of the army. With the growth of the science of maintaining an army in the field has grown the science of attack and defence of the channels of life of the force, independent perhaps of actual trials of military strength. These successive changes are very similar to our development from self-contained sailing fleets to fleets of battleships dependent on coal. Are our ideas thoroughly resonant to the change?

The importance of realising them.

Again, rapidity of movement by the use of military railroads prevents the conditions which gave rise to the strategic moves of dealing the right-and-left blows which made Napoleon's early campaigns of such momentous and historic value. To us a far greater change in speed has arrived. Have we so thoroughly sifted the operations of the past that we are mentally able, with comfort, to discard historical ideas that are now out of date, and apply merely those which deal with the new conditions? Perfection in modern weapons has upset the relative equilibrium of the various factors of an army, and totally changed the disposition of the forces in front of the enemy. Naval

arms and fighting units have also changed, and new ones of unknown possibility arisen. In the history of Goliath and David we have foreshadowed the surprise of the battleship at the success of the torpedo-boat. Have our giants of battle perfectly learned the lesson not to expose themselves to the light and active striplings whom, in the glory of their own magnificent strength, they are so apt to despise? Should we not apply to strategy the old rule in navigation of when in doubt as to the ship's position to place her on the chart in the worst possible situation, and study future action from that point? In our strategic forecast we should give to every opposing arm its highest value, and attempt to forestall success by our preparedness, not by our dicta.

Genius in strategy lies in the forecast of the effect that alterations in details should have on the dispositions for war. If we study naval and military history from the point of view of change necessitating change, and note the frequency of the failure of forecast to appreciate this, we shall have equipped our minds, not only with many lessons that in the hour of necessity may be the germs of most valuable suggestions, but we shall perhaps be more inclined to broaden our views, and, being more expectant of the unexpected, be more prepared at the outset to forestall those surprises which lie hidden in the future.

R. H. S. Bacon.

CHAPTER XIII.

The Past Five Years' Warship-Building.

Magnitude of the work undertaken.

The period of five years during which the late First Lord of the Admiralty presided over the administration of the Navy was notable on account of the many wise reforms which were instituted,but it will stand out in the history of the sea service of the Empire as a *régime* marked by efforts of unexampled magnitude to strengthen the Fleet, and by an unfortunate failure, from various causes, to realise fully the hopes to which year by year Lord Goschen gave expression. He succeeded to office at a time when the Navy was beginning to recover its old position of supremacy, thanks to the Naval Defence Act and the programmes introduced by his predecessor, Lord Spencer. Many ships were already in course of construction, yet in his First Statement in March, 1896, Lord Goschen indicated that he was determined to press on the work of placing the Navy in a position of unrivalled superiority. It is apparent that the task that claimed his attention after the General Election of 1895 was to survey the naval position and arrive at an estimate of the real needs of the British Fleet in view of the activity of other Powers. Eight battleships, six first-class cruisers, thirteen of the second class, and one of the third class, besides twenty torpedo-boat destroyers, were under construction. He asked the House of Commons to authorise the laying down, in the financial year 1896–7, of five battleships and four first-class cruisers, besides three second- and six third-class cruising ships, and twenty-eight torpedo-boat destroyers. In the Statement accompanying the Navy Estimates Lord Goschen promised that this programme should be prosecuted with the utmost energy. "The policy of acceleration will be pursued vigorously in the year 1896–7," he wrote. "A considerable proportion of the increase in the Shipbuilding Vote is due, not only to the number of new ships which it is proposed to build, but to the rapidity with which the contractors will be called upon to complete the third-class cruisers and torpedo-boat destroyers

for which they may obtain orders." The administration was to be characterised by rapid construction; at the end of the five years its feature is seen to have been continuous delays in the dockyards and on the part of the private firms, in supplying armour, guns, and machinery, and consequent under-expenditure of the moneys provided by Parliament. The building records established first by the Royal Sovereign, which was in commission within thirty-two months of her laying down, and greatly improved by the Magnificent and Majestic, which were ready for sea in every respect in twenty-four and twenty-two months respectively, have been lost. It is proverbial that quick building is cheap building, and in the past five years it has been shown that slow construction is dear construction. The cost per ton of armoured ships has risen from £60 10*s.* in 1895 to £75 1*s.* per ton in 1899. To some extent this appreciation has been due to increased outlay on material, labour, and machinery, but the retardation cannot have failed to influence the rise.

It will be seen that the First Lord of the Admiralty and his colleagues, in spite of the legacy that they inherited from their predecessors, lacked neither courage nor an understanding of the great charge that had been committed into their hands, of maintaining the strength of the British Fleet on an equality of numbers with and superiority of power to that of the next two strongest nations; but it has been suggested that they have failed to execute fully the programmes that have been undertaken.

Programmes for 11 years.

Without entering fully into the thorny controversy of relative strength, it can be shown that the five years just ended have witnessed the commencement of more men-of-war of various types than any preceding quinquennial period. On the next page is a statement of the programmes authorised in the past eleven years.

In this statement is set forth the number of ships authorised from year to year since the passing of the Naval Defence Act. During these eleven years 40 battleships, 20 armoured cruisers, 19 first, 47 second, and 15 third class cruisers have been laid down, in addition to 18 torpedo gunboats, 113 torpedo-boat destroyers, 14 torpedo-boats, 6 gunboats, and 14 sloops. Of this fleet—for it is, in fact, the main force upon which the defence of the Empire would depend in case of hostilities—half the battleships, all the twenty armoured cruisers, eighteen of the cruisers, and fifty-one of the destroyers, not to mention ten sloops and six gunboats for river work, belong to the programmes introduced during Lord Goschen's *régime*. If we group all the armoured ships together, it will be seen that to the credit of the late Board at Whitehall during the last five years stand just twice as many vessels

as were authorised in the preceding six years of great activity; but whereas Lord Spencer laid down only as many ships as could be pressed forward to completion, Lord Goschen put on the stocks a large number of vessels which, from one cause or another, have not been pushed forward to completion with the celerity which was promised and desired, with the result that arrears have accumulated.

Year.	Battle-ships.	Ar-moured.	Cruisers. 1st.	Cruisers. 2nd.	Cruisers. 3rd.	Sloops.	T.B.D.'s	T.B.G.'s	Torpedo boats.	Gun-boats.
Naval Defence Act 1889–1894 ..	10	..	9	29	4	..	..	18	..	..
Additions, 1892–1893	1	..	..	..	..	..	..	..	10	..
„ 1893–1894	2	..	2	3	..	2	20	..	..	..
Total for five years, 1889–1894 ..	13	..	11	32	4	2	20	18	10	..
1894–1895	7	..	..	6	..	2	42	..	..	..
1895–1896	..	..	4	4	2	..	..	..	..	..
1896–1897	5	..	4	3	6	..	28	..	..	..
1897–1898	4	..	..	..	3	2	2	..	..	4
Supplementary Programme, 1897 ..	..	4	..	..	..	..	4	..	..	..
1898–9	3	4	..	..	..	4	..	..	..	..
Supplementary Programme, 1898 ..	4	4	..	..	..	..	12	..	..	..
Totals for five years, 1894–1899 ..	23	12	8	13	11	8	88	..	..	4
1899–1900	2	2	..	1	..	2	..	..	2	..
1900–1901	2	6	..	1	..	2	5*	..	2	2
Totals for three previous years ..	16	12	4	8	9	6	46	..	..	4
Totals for five years, 1896–1901 ..	20	20	4	5	9	10	51	..	4	6
Total for 11 years, 1889–1901 ..	40	20	19	47	15	14	113	18	14	6
	306									

* Supplementary Estimate, 1900.

Bearing in mind the opinions expressed by the late Admiral Sir Geoffrey Hornby, and other officers, and the number of cruisers laid down by foreign Powers, it is apparent that the Admiralty have not lately attempted to meet, or at least have not succeeded in meeting, the maximum requirements in the matter of fast cruising ships, having in the years under review begun the construction of only nine first and second class vessels. It is no doubt true that armoured ships, such as the Cressy and Essex classes, are intended in some measure to do the work that five or six years ago would have fallen to merely protected ships, and the success of wireless telegraphy may have affected the official calculations. Nevertheless the recent

Cruiser programmes.

manœuvres, as well as previous Fleet movements, have clearly demonstrated the immense value of the protected scouting ships that we obtained under the Naval Defence Act, while our commerce will necessarily require the service of many cruisers, protected or otherwise. Owing to the policy of the late administration of the Navy we are in a worse relative position as to cruisers than we were in 1896. But, after all deductions have been made on account of the practical cessation of the construction of scouts in latter years, the period has been remarkable for the unparalleled efforts which have been put forward to strengthen the Fleet. On two occasions, in response to challenges by rivals, supplementary programmes were introduced.

Sums under-spent.

Unfortunately very soon after actual work on the ships authorised in 1896 had been begun, the engineering dispute of 1897 occurred; and when Lord Goschen presented his Estimates in the spring of 1898, he had to deplore the complete disorganisation of the previous year's work, and the under-expenditure of the money voted twelve months before to the extent of £2,109,654. It was recognised that the situation was most serious, and the Admiralty promised that everything possible should be done to retrieve the position. Official anticipations, as is now well known, were not realised. The following figures indicate the under-expenditure of the five years, 1896-1901, so far as they are at present known, the statements being founded on the Auditor-General's reports :—

	Estimate.	Expenditure.	Spent less than Estimate.
	£	£	£
1896-7	7,384,874	7,327,166	—
1897-8	7,161,043	5,051,389	2,109,654
1898-9	7,688,697	6,732,925	955,772
1899-1900	8,855,481	7,518,456	1,337,025
1900-1	8,460,146	—	—
	39,550,241		4,402,451

Causes of under-expenditure.

Such is the apparent deficiency on the past five years' shipbuilding operations, but the late First Lord protested against this view, and claimed that in the Estimates subsequent to the engineering strike provision was made for overtaking the leeway unfortunately lost. It is certainly true that in March, 1898, it was stated that in the succeeding twelve months it was hoped to clear off the sum of £1,400,000. If this amount is deducted from the total, it being actually re-voted money, we get the approximate total of just over three millions sterling as the sum below the Estimates spent in these years.

It has been urged on more than one occasion that this disorganisation has been entirely due to the results of the great labour trouble. The examination of this excuse leads to interesting conclusions. There is reason to fear that if due enquiry were made two ominous facts might be disclosed. First, it has been inferred that, possibly in the anxiety to obtain the very latest improvements in machinery and armament, the construction of ships *urgently required* was unduly and, in the circumstances of the time, dangerously delayed, and, again, that in some cases the needs of many vessels were overlooked until there was insufficient time available for the execution of orders for the delivery of material. The shipbuilding of the past three or four years particularly has been characterised by a series of delays that have had most injurious results. Again, there is the often discussed question of the penalty clause. Although many contractors have been behindhand in the delivery of material, in no case save one, and then under peculiar conditions, has the clause that was intended to meet such an emergency been put into operation.

Contractors' complaints.

The suggestion is that work for the Admiralty is undertaken with such a low margin of profit that the infliction of fines would lead to a revolt of the contractors. Certain it is that one firm after another, which has devoted itself to work for the British Navy, has become involved in financial difficulties. It is very questionable whether the authorities would not do well to take the stand of an ordinary business house, give out contracts, as they are distributed every day in the large centres of trade, with a clear understanding that the prices agreed upon are such as to permit of the work being carried out in a specified time, and that any default will result in the imposition of penalties. Moreover—and this is a point of much importance—after a contract has been signed and the work begun there should be no interference with the designs. If all plans, as under the Naval Defence Act, were considered by a body of experts, including officers of long sea experience, as a rule there would be no need for amendments, no afterthoughts would lead to the delay of work. A warship is the most complicated structure of the brain and hand of man, a combination of compromises, and only when it is studied by the many rather than the few can all the problems receive a satisfactory solution.

Seeing that we invariably build in classes, there should be little difficulty in abiding by a regulation that only in a matter of real importance shall any official, with the consent of the Board, have the power to vary the details of a ship already under construction. If this rule were adopted, and an experienced official under the Con-

troller of the Navy were made responsible for the even progress of all contract work, it is probable that we should soon have heard the last of ships waiting for armour, guns and machinery, provided that labour disputes did not recur. Not until some such arrangement is made by which all branches of contract work are under the hand of one responsible official, who will see that the work on ships proceeds *pari passu*, every want being anticipated in time by the requisite order, can a fully satisfactory system be arrived at.

Increased cost of ships.

A glance at the latest dockyard expenses accounts indicates that the estimated cost of ships has had a marked tendency to exceed the estimate, and this although, as already remarked, they belong to classes; while in spite of the under-expenditure in actual shipbuilding, there has been no corresponding reduction in the "establishment charges." In fact, there is evidence to show that the past five years' construction because slow has also been most expensive. Eleven years since, when he introduced the Naval Defence Act, Lord George Hamilton deplored this tendency in British shipbuilding at that date, and made it the excuse for the financial arrangements by which this legislation was characterised. Experience has amply supported his conclusions. "Rapidity of construction," he said, "means economy, because delay occasions two-fold waste—not only does a ship cost more in construction, but the longer it is on the stocks, the less time is it alive as an effective ship, and therefore the less use you get out of it." Those who will carry their memories back a few years and call to mind how short is the existence, as a first-class weapon, of ships that in their day have been regarded as well-nigh perfect, will appreciate the importance of working out all designs carefully, embodying every possible improvement, and then going ahead with the work with all dispatch.

Majestic class delayed.

One of the earliest effects of the engineering dispute was the delay in the completion of the remaining vessels of the Majestic class. The Cæsar, Illustrious, and Hannibal were to have been ready to hoist the pennant in 1897. Early in the following year the first-named was completed, and the others were not commissioned until the summer of 1898, while the delays with the contract-built Jupiter and Mars were even worse. Each of these five ships occupied over three years in building, the Hannibal making a new modern record in dilatory construction. Laid down on May 1, 1894, she was not ready to be passed into the fleet reserve until May 9, 1898, a period of just over four years. Against the name of Hannibal the Accountant-General in his report makes the following note: "Excess of total cost principally due to approved alterations and additions,"

and in another place practically the same comment is appended to the Jupiter and Mars to account for the excess expenditure. The tenders in these two cases were received and the keel plate laid long before there was a whisper of the labour trouble, and if they had progressed as well as did the Majestic and Magnificent, they should have been ready for service before the storm burst. The fact is that our shipbuilding had begun to fall in arrears in 1896, and the labour dispute merely accentuated the disorganisation..

The Canopus class.

As soon as Lord Goschen returned to the Admiralty, after a quarter of a century's absence, he announced that it had been decided to lay down five battleships of moderate dimensions, improved Renowns, with a displacement of 12,950 tons. For twelve months, in accordance with recent custom, this programme remained a paper one merely, and then the Albion and Glory were laid down at Blackwall and Birkenhead respectively in December, followed by the Canopus and Goliath at Portsmouth and Chatham in January, and the Ocean at Devonport on February 15, 1897. A great quantity of material at the three Royal dockyards had been already temporarily fitted together beforehand, thus discounting the value of these dates as a guide to the actual time occupied in building. In the Estimates of 1897–8 was included another vessel of the same class, the Vengeance, which was commenced on August 23, 1897. The history of these six ships has been one of shattered hopes. The Canopus and Goliath were quickly got off the slip—in nine and thirteen months respectively; while the Ocean was in hand at Devonport sixteen and a half months. It was after these ships and their sisters were in the water that the worst delays occurred, owing to the non-delivery of armour, machinery, and other material, and the result is that in comparison with the performances in connection with the Majestic and Magnificent, the time occupied in their completion for sea is most deplorable. The naked outline of their careers may be summarised thus:—

	Laid Down.	Completed.	Time Building.
Canopus	Jan. 4, 1897	Dec. 5, 1899	35 months.
Goliath	Jan. 4, 1897	April 1, 1900	39 „
Ocean	Feb. 15, 1897	Feb. 20, 1900	36 „
Albion	Dec. 3, 1896	Delivered	51 „
Glory	Dec. 1, 1896	Nov. 1900	47 „
Vengeance	Aug. 23, 1897	Not delivered	43 „

When the Canopus was laid down, it was intended that she should be flying the pennant within twenty months, whereas thirty-

five months, nearly three years, was the period occupied, and it will be seen that her sisters have fared considerably worse. The Albion had the misfortune at the end of last year to develop defects during her gun tests, which hindered the carrying out of her steam trials. Over five years will have elapsed since Parliament voted the money for the commencement of this ship before she will be ready to take her place in the Fleet. The Vengeance was delayed at her contractors' until certain dock alterations could be made at Barrow. Five years will also probably be her record.

Armoured ships of 1897–1901 programmes.

None of the armoured ships of the 1897 and later programmes has yet been completed. The appended statement indicates the dates of authorization and laying down of the following vessels :—

Authorised.			Laid Down.	Time under Construction.
1897	Vengeance, Barrow ...	...	Aug. 23, 1897	3 years 7 months.
"	Formidable, Portsmouth	...	March 21, 1898	3 years.
"	Irresistible, Chatham ...	...	April 11, 1898	2 years 11 months.
"	Implacable, Devonport	...	July 13, 1898	2 years 8 months.
1898	London, Portsmouth	...	Dec. 8, 1898	2 years 3 months.
"	Bulwark, Devonport	...	March 20, 1899	2 years.
"	Venerable, Chatham ...	...	Jan. 8, 1899	2 years 2 months.
July 1898	Duncan, Blackwall	...	July 19, 1899	1 year 8 months.
"	Cornwallis, " ...	...	" "	" "
"	Exmouth, Birkenhead	...	Aug. 1899	1 year 7 months.
"	Russell, Jarrow ...	...	March 1899	2 years.
1899	Albemarle, Chatham ...	...	Jan. 8, 1900	1 year 2 months.
"	Montague, Devonport	...	Nov. 23, 1899	1 year 4 months.
1900	Queen, Devonport	...	March 1901	
"	Prince of Wales, Chatham	...	" "	

Stages of incompleteness.

These figures supply facts of great import for consideration. They form a summary of the progress, or rather want of progress, of all the battleships included in the programmes of the past four years. The oldest of them is incomplete still. Seven, judged on the basis of the record established by the Majestic, should have been ready for duty this spring, and several of them many months earlier. The Implacable, which was to have been completed this year, has only just carried out her trials. The Irresistible will not be ready for commissioning before the autumn, and the same date can be assigned for the completion of the Formidable. The London and Venerable cannot begin their steam trials for many months, and are expected (officially) to be ready for service in May, 1902. The Bulwark may be completed early next year. Of the state of the later ships, on the supplementary programme of 1898 and of the ordinary programme of 1899, it is yet early to speak. The two dockyard vessels have been launched, and the ships of last year's programme have been laid down just in time for them to be included

in the retrospect of this financial year. The Russell, building by contract, was launched on February 19th of this year, and the Duncan on March 21, and the Exmouth, it is contemplated, will be floated out in May.

A misleading standard.

From time to time a great deal is made of the fact that so many battleships have been launched from certain yards, as though this fact were an accurate criterion of the progress of shipbuilding. In every Government yard, however, the construction actually begins before the keel is laid, and owing to the present policy of providing each yard with only one battleship slip, the energy of the yard is concentrated on the vesssel approaching the launching stage, only for her to fall into arrears as soon as she is in the water and another ship has taken her place on the slip. The subjoined statement shows the time which elapsed between the laying down of the first and the launch of the third of the ships in each group :—

Portsmouth :—Canopus, Formidable, London, nearly 32½ months.
Devonport :—Ocean, Implacable, Bulwark, 32 months.
Chatham :—Goliath, Irresistible, Venerable, 34 months.

The above statement is an indication of the celerity with which a ship can be launched, and is in strong contrast with the subsequent fortunes of these vessels. Each ship, it will be seen, was on the slip about eleven months, and has taken two years or more to complete. Whatever may have been the cause of the later delays, no one can pretend that the mere launching of a skeleton is a satisfactory test as to the strengthening of the Navy. By an unfortunate circumstance, the passing of a ship into the water is made the occasion of an elaborate ceremony, whereas, from a naval point of view, the important date is that on which the maiden pennant is hoisted.

While referring to this subject, reference to another matter may, perhaps, be excused. In view of the present system of delaying construction for ten or eleven months after parliamentary sanction is obtained, and the practice of beginning the building in a temporary manner, the public are deceived. In all calculations it would be far better if the time occupied in the construction of a new ship dated from the March in which she is authorised to the day on which she is passed into the "A" division of the Fleet, as absolutely ready for sea.

Armoured cruisers.

Under construction we have twenty armoured cruisers. In the Fleet at present we can number no modern vessels of this important type, though France and Russia have added many to their navies in the past few years. When it was decided to follow in the

footsteps of our two rivals, Lord Goschen did not fail to confide to the House of Commons that the need for these ships was urgent, and that no effort should be spared to add as many of them as were necessary to the Fleet at the earliest possible moment. Early in the summer of 1897 the first four of the Cressy class, of 12,000 tons, were provided for in the Supplementary Estimate. Over three and a half years have elapsed, and the first of the type, the Cressy, has just carried out her trials, the Sutlej has recently been delivered by the builders, and the other two are in varying stages of incompleteness. The Euryalus, authorised in March, 1898, three years ago, has not yet been launched.

Protected cruisers.

It is hardly necessary to refer at great length to the dilatory manner in which in the past five years cruising ships requiring little armour have been added to the Fleet. The delays have, in several cases, been most grievous, though on the whole, perhaps, less dangerous than in that of armoured ship-building. Almost all the anticipations of the year 1897 were unfulfilled. In March, 1899, of the eight first-class cruisers in hand—the Andromeda (laid down December 2, 1895), Europa (January 10, 1895), Niobe (December 16, 1895), Diadem (January 23, 1896), Argonaut (November 23, 1896), Amphitrite (December 8, 1896), Spartiate (May 10, 1897)—the last protected ships of the improved Powerful type to be authorised, the Andromeda had not completed her trials, and the Spartiate, Argonaut and Ariadne were far from ready for service. The Diadem did not hoist the pennant until July 19, 1898 (two years and six months after laying down), and the Niobe not until December 8, 1898 (three years after commencement), while the Spartiate late last year began her trials, developed defects, and will probably not be finished in all particulars until April or May, after being in hand over six years. It is a most unhappy record, but unfortunately there are other ships that have had little more fortunate careers. The second-class cruisers, Highflyer and Hermes, were about two years and a half, counting from the date of the laying of the keel only, before they could be passed into the Fleet Reserve. One particularly conspicuous straggler, the Pandora, which was laid down at Portsmouth on January 3rd, 1898, is still mentioned as "completing," and there is no whisper as to the date when she will finish her trials. Over three years she has been in progress, and it is four years since authorisation was given by Parliament.

Torpedo-boat destroyers

It remains to refer to the measures which have been taken to increase the number of torpedo-boat destroyers. No better testimony on this subject can be adduced than the report of the Committee of

Public Accounts, who stated in July last:—"The Controller and Auditor-General reports upon more than one contract in respect of which non-delivery has taken place without any infliction of the penalties incurred, and eleven different destroyers are named, which on the 31st of March, 1899, were undelivered, the period of arrear varying from seventeen months to two years, in several instances. The potential penalties in all the cases taken together were £113,760; but on the date mentioned the balance of unpaid purchase money was only £100,098. In no case has any penalty been inflicted."

Constructors of these craft have sadly fallen from the standard that they established in earlier years. The Whiting was completed in every particular in fourteen months, and the Bat in two months more; yet the Express, Otter, and Vulture were in hand four years, the Electra and Recruit five years, the Fervent six, and the Zephyr even longer. The last two vessels belonged to the first forty-two ordered by the Government, and were assumed to be out of date before they were completed. So rapidly are advances being made in the design of these ships that, unless they can be finished in a year or eighteen months, it would be better that the placing of contracts should be delayed until the authorities can make arrangements for the completion of orders within a reasonable period, with all the latest improvements of machinery. At most they have a life of only a little over ten years, and experience has shown that their existence is less than this official estimate, owing to the great strides that have been made in increasing their speed. While the Viper and Cobra can do their 35 knots an hour, it is bad economy to be adding to the flotillas, as we are to-day, crafts of 27 and 30 knots, delayed beyond all reason.

Standard periods for construction.

What is the standard period which the various types of ships should occupy in construction? An answer to this question will enable an estimate to be formed as to the present arrears. A satisfactory reply presupposes an organisation of a businesslike character, which shall anticipate the needs of each ship in time to enable the work to be carried on without hindrance of any avoidable character. From what has already been stated, it is suggested that such an organization has not been operative in the past five years, whatever the causes may have been. As it was possible to build the Majestic and Magnificent, the first of a new class, in two years or less from the laying of the keel plates, and under three years from their authorisation by Parliament, it ought to be practicable in the case of all ships of the armoured classes to keep close to this splendid standard, on the principle that quick building is cheap building. But it may be conceded that some grace should be allowed on account of exceptional circumstances, though it is not easy to see why any difficulties should

be experienced in a country where all ships are built in large classes, and where the general plans for one serve for half-a-dozen or more. For a similar reason it ought to be possible to complete a first-class cruiser well within three years from the date of the programme, or two years from the laying down. A second-class ship should be ready within a couple of years, and a torpedo-boat destroyer in eighteen months at most. These standards have been beaten time and again.

Ships in arrears.

If we accept these bases for calculation, it will be admitted that every battleship and first-class cruiser of the 1898 and previous programmes, and every smaller cruising ship and other minor craft of 1899 or before, should be to-day in the Fleet. The following ships are in arrears, excluding the Albion and Cressy, which may be regarded as nearly complete :—

Battleships : Vengeance, Formidable, Irresistible, Implacable, London, Bulwark, Venerable.

Armoured Cruisers : Aboukir, Hogue, Sutlej, Euryalus, Bacchante, King Alfred, Drake.

First-class (protected) Cruiser : Spartiate.

Third-class Cruiser : Pandora.

Torpedo-boat Destroyers : Ten.

Official explanations.

This is the tale of delay at the present date, as another financial year opens, and it can only be hoped that energetic steps will be taken to retrieve the past. Eleven years ago, when he was introducing the Naval Defence Act, Lord George Hamilton pointed out the two-fold evil that arises from delayed construction. This truth is supported by the Navy Estimates for the past few years. In many instances, the original estimates have been largely over-spent. The Andromeda exceeded the original figures by no less than ten per cent., while the sister cruisers, Gladiator and Vindictive, varied in cost by as much as £25,000. An explanation was given to the Committee on Public Accounts for this latter discrepancy in the case of ships built under the same condition as to labour and cost of material. Mr. Goddard, of the Admiralty, stated :—

"The Admiralty consider the conditions are not precisely similar, although they are similar ships so far as the hull went, and both built in a dockyard; but the Gladiator was in hand eight months longer than the Vindictive. We had to wait for the engines from the contractor, and therefore the ship was very much longer in hand than the sister ship. That always necessitates a certain amount of extra cost. The two ships, again, were not built under the same conditions, because the Gladiator was built upon a slip, and the Vindictive was built in a dock; and the cost of building a ship on a slip is, for various reasons, more than if you build in a dock. It is not only

that you have launching expenses in the one case, which you have not in the other; but there is greater difficulty in getting building materials into place on the ship."

Slip *versus* dock.

The witness explained that he was only referring to the construction of the hull. The same witness also admitted that the present practice of commencing the construction of ships at Pembroke and completing them at another yard makes these vessels "extra expensive." Yet it could be shown that the alterations now being carried out by the Admiralty to remedy this waste were urged upon them several years before any steps were taken in the matter. Probably enquiry, however, would show that the naval authorities are not to blame. The expenditure of large sums on dockyard machinery and basins is not heroic, and makes no appeal to the imagination of the taxpayer. Consequently, when it is a question between laying down a new ship and improving the facilities for building and repairing, Governments are apt to take the unheroic course, and harvest the praise that is always accorded to an Administration which begins ships, quite irrespective of the arrangements for their completion.

Variations in cost.

There can be no doubt that the operations of the workmen and officials of the Royal yards are sadly hampered by old and inefficient machinery, and that money is thereby wasted. Addressing the Institution of Naval Architects in 1895, Mr. Francis Elgar stated that "The differences between the cost of work in the various dockyards show, to some extent, the effect of inadequate appliances or arrangements for carrying on work quickly and economically. The most costly ships are those built at yards which were most backward at first in these particulars; and much might yet be done in the way of improvements." Since these remarks were made, one of the most notable features of the reports of the Auditor-General has been the difference between the original estimate of ships and the revised estimate, and, again, between the latter and the actual cost. Without going into many details, it is not easy to indicate fully the variations between these figures, but a few typical instances may serve to illustrate the point:

Ship.	Original Estimate.	Revised Estimate.	Actual Cost.
Jupiter	£859,393	£876,292	£880,811
Hannibal	809,113	816,282	846,678
Illustrious	797,010	809,140	831,542
Prince George	813,679	823,127	818,177
Mars	860,048	876,337	879,647
Renown	626,370	646,399	650,078
Powerful	639,364	682,250	686,143
Terrible	646,641	686,583	689,357
Doris	244,571	246,488	248,755

These are merely incidental figures, the latest available, but they tend to show the value that attaches to the original estimates of the cost of ships, and how wide of the mark in some cases are the revisions that are made after the construction of the ships is in hand. If the "incidental charges" had been included, the contrasts would have been even more glaring. To the lay mind it would seem that there should be no great divergence between the cost of ships of the same class, and yet it is exceptional for two vessels to entail about the same expenditure. The Furious, at Devonport, cost £242,679, while the sister ship, Gladiator, at Portsmouth, cost £250,044, although both vessels were built almost simultaneously, and under the same conditions. Similarly the Cæsar, at Portsmouth, cost £794,456, and the Illustrious, at Chatham, under construction at the same time, and, therefore, when labour and material in the two yards should have absorbed about the same sums, was not completed for less than £831,542—a wide difference, even allowing for minor alterations in design. When ships are built by contract, these contrasts do not occur so frequently. The Jupiter and Mars cost the same amount within less than £2,000, and there was little difference between the Diana, Dido, Doris, Juno, Isis, and Venus, but there was considerable variation in the outlay on the Diadem class, over £14,000 separating the Europa and Niobe, though it has never been suggested that the latter is the superior, and they were built almost simultaneously. Without attempting to explain the discrepancies in the contract-built ships, some explanation should be forthcoming as to the causes which led some of the dockyard ships to eat up so much more money than their sisters, and steps should be taken to make the cost of sister ships built under identical conditions as to labour and material approximate more nearly. If the appliances of any of the yards are so seriously out of date as to account for the divergent figures, or the organisation is defective, it should be possible for the authorities to apply remedies.

Anticipations unfulfilled.

This retrospect of war-shipbuilding since 1896 indicates how great has been the strain on the resources of the country. Under the circumstances it was, perhaps, hardly to be wondered at that Lord Goschen should have come to the conclusion that it was impossible to embark on a larger programme last March. Ever since he went to Whitehall, he had been increasing the votes for new construction and yet unable to conquer the difficulties that hindered the completion of ships. It has been a period of proposals of unexampled magnitude, but, even admitting that the engineering dispute has been largely accountable for the retardation of work in the private establishments as well as in the Royal Dockyards, the performance

has been poor compared with the repeated promises and anticipations. Behind the labour trouble lie other causes for the *impasse,* and it is well for the future of the Navy that an attempt is being made to investigate the origin of the creeping paralysis from which the war-shipbuilding resources of this country have been suffering. It has resulted in the death of several firms, impaired the prosperity of others, and has placed back the hands of the clock by many months. Ships that should be flying the white ensign are still mere skeletons in the various yards, and the longer they remain incomplete, the less value are they to the Empire they were built to protect. The questions of the cause of the present arrears, and the means by which they can be avoided in the future, have been investigated by a Committee, consisting of Mr. H. O. Arnold-Forster, Financial Secretary to the Admiralty; Rear-Admiral A. K. Wilson, recently Controller of the Navy; Sir Thomas Sutherland, and Sir Francis Evans. Every confidence has been felt in this Committee, and it is to be hoped that on their report such reforms will be initiated as will place the relations of the Admiralty and contractors on a more satisfactory basis, and ensure that the country shall get the most efficient and prompt service from all who are entrusted with work for the fleet. The continued existence of the great private yards is an important national asset, and the public may well pause before allowing a system to be pursued which may rob the Empire of the resources, hitherto absolutely unrivalled, which have always been regarded as one of the bulwarks of our existence as a trading, colonising, and freedom-loving people. It has repeatedly been urged in the past that in the last resort these establishments could add a large number of ships to the Fleet in a year or two. It will be well for us that we should always be able to make that boast.

ARCHIBALD S. HURD.

PART II.

BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

PART II.

ALPHABETICAL LIST OF BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

The arrangement of the lists of ships has not been changed since the important modifications made in the edition of 1896. The order of the columns corresponds in the British and Foreign Lists, except that in the former there are spaces for the makers of engines and the bulkhead protection, while the date of completion is given in the case of armoured ships instead of that of the launch. The calibre of all foreign guns is given in inches.

The maximum draught at normal displacement has been given wherever it was possible to ascertain it.

As every nation is constantly rearranging the armament of individual ships, it is only possible to publish the latest accessible information.

The vessels which in the British Official *Navy Lists* are called First-Class Gunboats, and in the French Lists are known as Aviso-Torpilleurs, are called in these lists Torpedo Gunboats. Torpedo-boats of all classes below Torpedo Gunboats are placed in a separate list.

Storeships, Harbour Service Ships, and Training Ships are not included in these lists.

The ships of those Powers whose Navies are of small importance will be found at the end of Part II.

The sketches of a larger number of ships have now been reduced to half scale, so as to enable more sketches to be given without unduly increasing the size of the book.

The following abbreviations are used throughout the Alphabetical List, occurring mainly in the first column, showing the class of ship, and in the armour column:—

a.c. Armoured cruiser.
a.g.b. Armoured gunboat.
b. Barbette ship.
br. Broadside ship.
c.b. Central-battery ship.
c.d.s. Coast-defence ship.
c. Composite-built hull.
comp. (in armour column). Compound or steel-faced armour.
c.t. Conning-tower.
corv. Corvette.
cr. Cruiser.
d.v. Despatch vessel.
g.b. Gunboat.
g.v. Gun-vessel.
H.S. Harveyised or similar hard-faced steel.
K.S. Krupp steel.
I. Iron hull.
shd. Sheathed.
s. Steel hull.
2 s. Twin screw.
t. Turret-ship.
t. Trial-speed and I.H.P. at trials (in speed and I.H.P. columns).
to.cr. Torpedo-cruiser.
to.g.b. Torpedo-gunboat.
to.r. Torpedo-ram.
w. Wooden hull.

ARMAMENT ABBREVIATIONS.—As breech-loading rifled guns are now the most numerous in all fleets, it must be understood that all guns are of that description, unless it be otherwise indicated.

l. Light guns under 15 cwt., including boats' guns.
M.L.R. Muzzle-loading rifled guns.
Q.F. Quick or rapid-firing guns; unless otherwise indicated all guns following that first marked as Q.F. in the armament column are also quick-firers.
f. tu. or b. tu. Fixed or bow tube for discharging Fish Torpedoes.
sub. Submerged tube for do.
B.L. To 6-in. guns indicates that separate cartridges are used, but it must be observed that though this service classification is retained for the latest pattern 6-in. (Vickers) gun, which has no metal cartridge, that gun attains the full Q.F. rate of fire.

BOILERS.—It has been thought desirable to indicate particulars of the water-tube boilers adopted in the principal fleets. The following abbreviations have, therefore, been given in the column devoted to indicated horse-power. Where no reference occurs the boilers are of the cylindrical type; but the letter "C" implies that cylindrical boilers are used in conjunction with the type of water-tube boilers indicated:—

W.T. Water-tube boilers, where the type is not known or not yet decided.
B. Belleville.
Bl. Blechynden.
B. & W. Babcock and Wilcox.
D'A. D'Allest.
D. Dürr.
E. Earle.
Ex. Express.
Du T. Du Temple.
L. Laird.
M. Mumford.
Nic. Niclausse.
Nor. Normand.
N.S. Normand-Sigaudy.
R. Reed.
T. Thornycroft.
T.S. Thornycroft-Schultz.
Y^1. Yarrow small tube.
Y^2. " large tube.

GREAT BRITAIN.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost ‡	Armour. Side.	Armour. Bulk-head.	Armour. Gun Position	Armour. Back-ing. Deck Plating.	Armament. Guns.**	Armament. Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.*	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.	in.	in.			knots.	tons.	
a.c.	Aboukir .	S. shd.	12,000	440 0	69 6	26 3	2	21,000 B	Fairfield .	Fairfield .	Bldg.	722,985	6 K.S.	5 K.S.	6 K.S.	3–2	2 9·2-in. 12 6-in. B.L., 17 smaller Q.F.	2	21·0	800 / 1600	615
t. 2nd c.	Agamemnon .	I.	8660	280 0	66 0	24 0	2	4500	Chatham	Penn .	1883	504 065	18–15	16	16	18–9 / 3	4 12·5-in M.L.R., 2 6-in. Q.F., 6 6-pr., 8 3-pr., 5 M., 2 l.	2	12·1	960	410
t. 2nd c.	Ajax . .	I.	8660	280 0	66 0	24 0	2	4500	Pembroke	Penn .	1883	518,357									
b. 1st cl.	Albemarle .	S.	14,000	405 0	75 6	26 6	2	18,000 B.	Chatham	Thames Iron Works	Bldg.	†	7	14	11–6	4–6 / 2–1	4 12-in., 12 6-in. B.L., 12 12-pr., 6 3-pr., 2 M., 2 l.	4	19·0	900 / 2000	750
b. 1st cl.	Albion . .	S.	12,950	390 0	74 0	26 0	2	13,500 B	Blackwall	Maudslay	Bldg.	802,910	6 H. S.	6 H. S.	12–5 H. S.	.. / 3–2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·25	800 / 1850	700
c.b. 2nd c.	Alexandra .	I.	9490	325 0	63 8	26 6	2	7000	Chatham	Humphrys	1877	514,324	12	8–5	8	12–10 / 1½–1	8 10-in. M.L.R., 4 9·2-in., 6 4·7-in. Q.F., 4 6-pr. Q.F., 6 3-pr., 13 M., 3 l.	4	14·3	680	600
b. 1st cl.	Anson . .	S.	10,600	330 0	68 6	27 3	2	11,500	Pembroke	Humphrys	1889	x 724,765	18 comp.	16 comp.	14–12 comp.	10–15 / 3–2½	4 13·5-in., 6 6-in. Q.F., 12 6-pr., 10 3-pr., 7 M., 2 l.	5	16·9	900 / 1200	515
a.c.	Aurora . .	S.	5600	300 0	56 0	24 6	2	8500	Pembroke	Thomson .	1889	284,550	10 comp.	16 comp.	4½	6 / 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3 pr., 6 M., 3 l.	2	18·0	900	484
a.c.	Australia .	S.	5600	300 0	56 0	24 6	2	8500	Glasgow	Napier .	1888	259,390						4			
a.c.	Bacchante .	S. shd.	12,000	440 0	69 6	26 3	2	21,000 B	Glasgow .	Clydebank	Bldg.	†	6 K.S.	5 K.S.	6 K.S.	.. / 3–2	2 9·2-in. 12 6-in. B.L., 17 small Q.F., 9 l.	2	21 0	800 / 1600	615
b. 1st cl.	Barfleur .	S. shd.	10,500	360 0	70 0	25 6	2	13,163	Chatham	Greenock Foundry	1894	599,089	12 comp.	12 comp.	9	.. / 2½–2	4 10-in., 10 4·7-in. Q.F., 8 6-pr., 12 3-pr., 7 M., 2 l.	7 (2 sub.)	18·5	1240	284
a.c.	Bedford . .	S.	9800	440 0	66 0	24 6	2	22,000 B.	Fairfield .	Fairfield Shipbg. Co.	Bldg.	..	4	..	..	..	14 6-in. B.L., 13 small Q.F.	..	23·0	800	..
c.b. 3rd c.	Bellerophon .	I.	7550	300 0	56 1	23 7	1	4000	Chatham	Penn .	1866	322,701	6	5	6	10	10 8-in., 4 6-in., 6 4-in., 4 6-pr. Q.F., 12 M., 4 l.	2	12·4	650	572

b. 1st cl.	**Benbow** .	S.	10,600	330	0	68	6	27	3	2	11,500	Blackwall	Maudslay .	1888	760,820	18 *comp.*	16 *comp.*	14–2 *comp.*	12–15 3–2½	2 16·25-in., 10 6-in. Q.F., 12 6-pr., 10 3-pr., 7 M., 2 l.	5	16·75	1200	509
a.c.	**Berwick** .	S.	9800	440	0	66	0	24	6	2	22,000 B.	Glasgow .	..	Bldg.	..	4–2	3	4	2–¾	14 6-in. Q.F., 10 12-pr., 3 3-pr., 9 M.G.	2	23	1600 800	...
b. 1st cl	**Bulwark** .	S.	15,000	400	0	75	0	26	9	2	15,000 B	Devonp't	Hawthorn	Bldg.	1,018,949	9	12	12–5	3–2	4 12-in. 12 6-in. B.L., 24 small Q.F., 8 M.	2	18·0	900 2000	750
b. 1st cl.	**Cæsar** .	S.	14,900	390	0	75	0	27	6	2	12,000	Portsm'th	Maudslay .	1897	865,533	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3 pr., 8 M., 2 l.	5 (4 sub.)	17·5	1850	757
b. 1st cl.	**Camperdown** .	S.	10,600	330	0	68	6	27	3	2	11,500	Portsm'th	Maudslay .	1889	*x* 769,456	18 *comp.*	16 *comp.*	12 *comp.*	10–15 3–2½	4 13·5-in., 6 6-in. Q.F., 12 6-pr., 10 3-pr., 7 M., 2 l.	4	16·9	900 1200	515
b. 1st cl.	**Canopus** .	S.	12,950	390	0	74	0	26	0	2	13,500 B	Portsm'th	Greenock Foundry	1900	869,598	6 H. S.	12 H. S.	12–5 H. S.	3–2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·25	800 1850	700
b. 1st cl.	**Centurion** .	S. shd.	10,500	360	0	70	0	25	6	2	13,214	Portsm'th	Greenock Foundry	1893	608,098	12 *comp.*	12 *comp.*	9 *comp.*	.. 2½–2	4 10-in., 10 4·7-in. Q.F., 8 6-pr., 12 3-pr., 7 M., 2 l.	7 (2 sub.)	18·25	1240	622
b. 1st cl.	**Collingwood** .	S.	9500	325	0	68	0	26	10	2	9500	Pembroke	Humphrys	1886	624,000	18 *comp.*	16 *comp.*	12 *comp.*	17–10 2½	4 12-in., 6 6-in., Q.F., 12 6-pr. 8 3-pr., 6 M., 2 l.	4	6·50	1200	480
t. 2nd c.	**Colossus** .	S.	9420	325	0	68	0	26	3	2	5500	Portsm'th	Maudslay .	1886	646,786	18–14 *comp.*	16–13 *comp.*	16 *comp.*	22–10 3–2½	4 12-in., 5 6-in. Q.F., 4 6-pr., 10 3-pr., 6 M., 4 l.	2	4·2	970	388
t. 3rd c.	**Conqueror** .	S.	6200	270	0	58	0	24	0	2	6000	Chatham	Humphrys	1882	418,433	12–8½	11½	12	13 2½–1½	2 12-in., 4 6-in. Q.F., 6 6-pr., 12 M., 2 l.	6	15·3	650	330
a.c.	**Cornwall** .	S.	9800	440	0	66	0	24	6	2	22,000 B.	Pembroke	..	Bldg.	..	4–2	3	4	2–¾	14 6-in. Q.F., 10 12-pr., 3 3-pr., 9 M.	2	23	1600 80	..
b. 1st cl.	**Cornwallis** .	S.	14,000	405	0	75	6	26	6	2	18,000 B	Blackwall	Thames S. Co.	Bldg.	†	7 K.S.	..	11–6 K.S.	..	4 12-in., 12 6-in. B.L., 12 12-pr. Q.F., 6 3-pr.	4	19	900 2000	750
a.c.	**Cressy** .	S. shd.	12,000	440	0	69	6	26	3	2	21,000 B	Fairfield .	Fairfield .	Bldg.	723,012	6 K.S.	5 K.S.	6 K.S.	3–2	2 9 2-in. 12 6-in. B.L., 17 smaller Q.F.	2	21·0	800 1600	615
a.c.	**Cumberland** .	S.	9800	440	0	66	0	24	6	2	22,000 B.	London & Glasgow Co.	..	Bldg.	..	4–2	3	4	2–¾	14 6-in. Q.F., 10 12-pr., 3 3-pr., 9 M.G.	2	23	1600 800	..
c.d.s. *t.*	**Cyclops** .	I.	3560	225	0	45	0	16	4	2	1200	Blackwall	Elder .	1871	154,026	8–6	9–8	9	11 1½	4 10-in. M.L.R., 4 3-pr. Q.F., 5 M., 1 l.	..	9·9	250	196

* When two set of figures are given the upper shows the coal capacity at load draught.
x Includes Hydraulic Machinery, Gun Mountings, &c.
† Details of cost incomplete.
** See note relating to the new Vickers 6-in gun on the previous page.
‡ Unless mentioned this does not include armament.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour. Side.	Armour. Bulk-head.	Armour. Gun Position	Armour. Back-ing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.	in.	in.			knots.	tons.	
t. 2nd c.	**Devastation** .	I.	9330	285 0	62 3	27 6	2	7000	Portsm'th	Maudslay	1873	353,848	12–10	12–10	14	18–16 3–2	4 10-in., 6 6-pr. Q.F., 8 3-pr., 5 M., 2 l.	2 (2 sub.)	14·0	1800	410
a.c.	**Donegal** .	S.	9800	440 0	66 0	24 6	2	22,000 B.	Fairfield Co.	..	Bldg.	..	4–2	3	4	2–¾	14 6-in. Q.F., 10 12-pr., 3 3-pr., 9 M.G.	2	23·0	1600 / 800	..
a.c.	**Drake** .	S.	14,100	500 0	71 0	26 0	2	30,000 B	Pembroke	Humphrys	Bldg.	*	6 K.S.	12 K.S.	12–5 K.S.	3–2	2 9·2-in., 16 6-in. B.L., 14 12-pr Q.F.. 3 3-p.	2	23·0	1250 / 2500	..
t. 2nd c.	**Dreadnought** .	I.	10,820	320 0	63 10	26 9	2	6500	Pembroke	Humphrys	1875	592,573	14	13	14	18–15 3–2	4 12·5-in. M.L.R., 6 6-pr. Q.F., 12 3-pr., 7 M., 2 l.	2	13·7	1200	453
b. 1st cl.	**Duncan** .	S.	14,000	405 0	75 6	26 6	2	18,000 B	Blackwall	Thames S. Co.	Bldg.	*	7 K.S.	..	11–6 K.S.	..	4 12-in., 12 6-in. B.L., 12 12-pr. Q.F., 6 3-pr	4	19·0	900 / 2000	750
t. 2nd c.	**Edinburgh** .	S.	9420	325 0	68 0	26 3	2	5500	Pembroke	Humphrys	1886	642,333	18–14 *comp.*	16–13 *comp.*	16 *comp.*	22–10 3–2½	4 12-in., 5 6-in. Q.F., 4 6-pr., 10 3-pr., 6 M., 2 l.	2	14·2	970	388
b. 1st cl.	**Empress of India**	S.	14,150	380 0	75 0	27 6	2	13,000	Pembroke	Humphrys	1893	838,087	18–5 *comp.*	16 *comp.*	17–6 *comp.*	.. 3	4 13·5-in., 10 6-in. Q.F., 16 6-pr., 12 3-pr., 8 M., 2 l.	7 (2 sub.)	17·5	1800	740
a.c.	**Essex** .	S.	9,800	440 0	66 0	24 6	2	22,000 B	Pembroke	JohnBrown	Bldg.	*	4	..	..	..	14 6-in. B.L., 13 small Q.F. guns	..	23·0	800	..
a.c.	**Euryalus** .	S shd.	12,000	440 0	69 6	26 3	2	21,000 B	Barrow	Vickers	Bldg.	*	6 K.S.	5 K.S.	6 K.S.	4 3–2	2 9·2-in., 12 6-in B.L., 14 12-pr. Q.F., 3 3-pr., 8 M.	2	21·0	800 / 1600	615
b. 1st cl.	**Exmouth** .	S.	14,000	405 0	75 6	26 6	2	18,000 B	Laird	Laird	Bldg.	*	7 K.S.	..	11–6 K.S.	..	4 12-in., 12 6-in. B.L., 12 12-pr. Q.F., 6 3-pr.	4	19.0	900 / 2000	750
b. 1st cl.	**Formidable** .	S.	15,000	400 0	75 0	26 9	2	15,000 B	Portsm'th	Earle	Bldg.	1,012,780	9	12	12–5	.. 3–2	4 12-in., 12 6-in. B.L, 24 small Q.F., 8 M.	..	18·0	900 / 2000	750
a.c.	**Galatea** .	S.	5600	300 0	56 0	24 6	2	8500	Glasgow	Napier	1889	258,390	10 *comp.*	16 *comp.*	4½	6 3–2	2 9·2-in., 10 6-in., Q.F., 6 6-pr. 10 3-pr., 6 M., 3 l.	4	18·1	900	484
c.d.s. *t.*	**Glatton** .	I.	4910	245 0	54 0	19 5	2	2000	Chatham	Laird	1872	219,529	12–10	12	14	20 3–1½	2 12-in. M.L.R., 3 6-pr. Q.F., 4 M., 1 l.		11·0	540	192

b. 1st cl.	Glory	S.	12,950	390	74	0	26	0	2	13,500 B	Laird	Laird	Bldg.	844,057	6 H. S.	12 H. S.	12–5 H. S.	3-2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·25	800 / 1850	700
b. 1st cl.	Goliath	S.	12,950	390	74	0	26	0	2	13,500 B	Chatham	Penn	1900	860,788									
a.c.	Good Hope, late Africa	S.	14,100	500	71	0	26	0	2	30,000 B	Fairfield	Fairfield	Bldg.	*	6 K.S.	5 K.S.	6–5 K.S.	.. 3–2	2 9·2-in., 16 6-in. B.L., 17 small Q.F.	2	23·0	1250 / 500	..
c.d.s. t.	Gorgon	I.	3560	225	45	0	16	4	2	1200	Jarrow	Ravenhill	1872	138,567	8–6	9–8	10	11 1½	4 10-in. M.L.R., 4 3-pr. Q.F., 5 M., 2 l.	..	9·9	2270	192
b. 1st cl	Hannibal	S.	14,900	390	75	0	27	6	2	12,000	Pembroke	Harland	1897	867,403	9 H. S.	14–9 H. S.	14·6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M., 2 l.	5 (4 sub.)	17·5	1850	757
c.d.s. t.	Hecate		3560	225	45	0	16	4	2	1200	Poplar	Ravenhill	1872	140,593	8–6	9–8	10	11 1½	4 10-in. M.L.R., 4 3-pr. Q.F., 4 M., 1 l.	..	9·9	270	205
c.b. 3rd c.	Hercules	I.	8680	325	59	0½	26	6	1	8500	Chatham	Penn	1868	361,134	9–6	6–5	9	12–10	8 10-in. M.L.R., 2 9-in. do., 2 7-in. do., 2 6-in. Q.F., 6 4·7-in., 9 6-pr., 13 3-pr., 7 M., 2 l.	4	14·6	610	638
t. 3rd c	Hero	S.	6200	270	58	0	24	0	2	6000	Chatham	Rennie	1888	397,271	12 comp.	11½ comp.	12 comp.	13½ 2½–1½	2 12-in., 4 6-in. Q.F., 7 6-pr., 12 M., 2 l.	6	15·2	620	330
a.c.	Hogue	S. shd.	12,000	440	69	6	26	3	2	21,000 B	Barrow	Vickers	Bld.	724,492	6 K.S.	5 K.S.	6 K.S.	4 3	2 9·2-in. 12 6-in. B.L., 17 small Q.F.	2	21·0	800 / 1600	745
t. 1st cl.	Hood	S.	14,150	380	75	0	27	6	2	13,000	Chatham	Humphrys	1893	830,536	18 comp.	17 comp.	18–6 comp.	.. 3	4 13·5-in., 10 6-in. Q.F., 10 6-pr., 12 3-pr., 8 M., 2 l.	7 (2 sub.)	17·5	900 / 1800	730
c.d.s. t.	Hotspur	I.	4010	235	50	0	21	10	2	2500	Glasgow	Napier	1871	171,528	11 & 8	8	10–8½	15–10 2–1	2 12-in. M.L.R., 2 6-in. Q.F., 6 12-pr., 4 3-pr. Q.F., 8 M., 2 l.	..	11·25	300	232
b. 1st cl.	Howe	S.	10,300	325	68	0	27	3	2	11,500	Pembroke	Humphrys	1889	667,022	18 comp.	16 comp.	11½ comp.	15–12 3–2½	4 13·5-in., 6 6-in. Q.F., 12 6-pr., 10 3-pr., 7 M., 2 l.	1	16·8	1200	515
b. 1st cl.	Illustrious	S.	14,900	390	75	0	27	6	2	12,000	Chatham	Penn	1898	885,945	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M., 2 l.	5 (4 sub.)	17·5	1850	757
a.c.	Immortalité	S.	5600	300	56	0	22	6	2	8500	Chatham	Earle	1889	278,500	10 comp.	16 comp.	4½	6 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3-pr., 6 M., 3 l.	2	18·0	900	484
a.c.	Impérieuse	S. shd.	8400	315	62	0	27	4	2	10,000	Portsm'th	Maudslay	1886	x 530,814	10 comp.	9 comp.	4½ comp.	10 4–2	4 9·2-in., 10 6-in. Q.F., 8 6-pr., 10 3-pr., 6 M., 2 l.	6	16·7	900 / 1130	544
t. 2nd c.	Inflexible	I.	11,880	320	75	0	26	4	2	6500	Portsm'th	Elder	1881	795,268	24–16	22–14	17 comp.	17–25 3	4 16-in. M.L.R., 8 4-in., 4 6-pr. Q.F., 2 3-pr., 15 M., 2 l.	4 (2 sub.)	12·8	1300	485

* Details of cost incomplete. x Includes Hydraulic Machinery, Gun Mountings, &c.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour. Side.	Armour. Bulk-head.	Armour. Gun Position.	Armour. Backing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in	no.					£	in.	in.	in.	in.			knots.	tons.	
b. 1st cl.	Implacable Irresistible London .	S.	15,000	400	0	75	0	26	9	2	15,000 B	D'port Chatham Portsm'h	Laird Maudslay Earle	Bldg.	1,002,909 986,731 1,023,671	9 K.S.	12 K.S.	12–5 K.S.	.. 3–2	4 12-in. 12 6-in. B.L., 24 small Q.F., 8 M.	2	18·0	900/2000	755
a.c.	Kent . .	S.	9800	440	0	66	0	24	6	2	22,000 B.	Ports'mth	Hawthorn	Bldg.	*	4	..	..	..	14 6-in. Q.F., 13 smaller guns.	..	23·0	800	..
a.c.	King Alfred Leviathan .	S.	14,100	500	0	71	0	26	0	2	30,000 B	Barrow . Clydeb'k	Vickers Clydeb'k	Bldg.	*	6 K.S.	5 K.S.	6-5 K.S.	.. 3–2	2 9·2-in., 16 6-in. B.L., 14 12-pr., 3 3-pr., 9 l.	2	23·0	1250/2500	900
a.c.	Lancaster .	S.	9800	440	0	66	0	24	6	2	22,000 B.	Elswick .	Hawthorn	Bldg	..	4–2	3	4	2–¾	14 6-in. Q.F., 10 12-pr., 3 3-pr., 9 M.G.	2 2	23 23	1600/800	..
b 1st cl	Jupiter . .	S.	14,900	390	0	75	0	27	6	2	12,000	Clydeb'nk	Thomson .	1897	901,216									
b 1st cl.	Magnificent .	S.	14,900	390	0	75	0	27	6	2	12,000	Chatham	Penn	1895	912,291									
b 1st cl.	Majestic . .	S.	14,900	390	0	75	0	27	6	2	12,000	Portsm'th	Barrow	1895	910,632	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8	5 (4 sub.)	17	1850	757
b 1st cl.	Mars . .	S.	14,900	390	0	75	0	27	6	2	12,000	Birkenh'd	Laird .	1897	902,631									
t. 3rd c.	Monarch . .	I.	8930	330	0	57	6	26	7	1	8216	Chatham	Maudslay	1869	354,575	7–6	5–4½	8	12	4 12-in. M.L.R., 2 9-in. do., 1 7-in. do., 4 12-pr. Q.F., 10 3-pr., 6 M., 2 l.	2	15	630	598
a.c.	Monmouth .	S.	9800	440	0	66	0	24	6	2	22,000 B.	Glasgow	London & Glasgow Shipbg.Co.	Bldg.	..	4	..	..	..	14 6-in. B.L., 13 small Q.F.	..	23·0	800	..
b. 1st cl.	Montagu . .	S.	14,000	405	0	75	6	26	6	2	18,000 B.	Devonport	Laird .	..	*	7	14	11·6	4–6 2–1	4 12-in., 12 6-in. B.L., 12 12-pr., 6 3-pr., 2 M., 2 l.	4	19·0	900/2000	750

a.c.	**Narcissus** .	S.	5600	300	0	56	0	24	6	2	8500	Hull	Earle	1889	257,390	10 *comp.*	16 *comp.*	4½	6 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3-pr., 6 M., 3 l.	4	18·1	750 / 900	484
t. 1st cl.	**Nile** . .	S.	11,940	345	0	73	0	27	6	2	12,000	Pembroke	Maudslay	1890	819,717	20–16 *comp.*	18–14 *comp.*	18 *comp.*	6 3	4 13·5-in., 6 6-in. Q.F., 8 6-pr., 12 3-pr., 7 M., 3 l.	6 (2 sub.)	16·7	1200	558
b. 1st cl	**Ocean** .	S.	12,950	390	0	74	0	25	5	2	13,500 B	Devonport	Hawthorn	1900	881,248	6 H. S.	12 H. S.	12–5 H. S.	3–2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·25	800 / 1850	700
c.d.s.	**Orion** .	I.	4870	245	0	52	0	21	4	2	2600	Poplar	Maudslay	1882	292,229	12–7	9–5	8	16–9 3–1	4 12-in. M.L.R., 6 6-pr. Q.F., 6 M., 2 l.	4	11·9	520	284
a.c.	**Orlando** .	S.	5600	300	0	56	0	24	8	2	8500	Jarrow	Palmer	1888	266,812	10 *comp.*	16 *comp.*	4½ *comp.*	6 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3-pr., 7 M., 3 l.	2	18·1	900	484
c.d.s. *c.b.*	**Penelope** .	I.	4470	260	0	50	0	17	6	2	2700	Pembroke	Maudslay	1868	186,848	6–5	4½	5	10–11	8 9-ton M.L.R., 4 3-pr. Q.F., 11 M., 4 l.	..	11·0	470	265
b. 1st cl.	**Prince George** .	S.	14,900	390	0	75	0	27	6	2	12,000	Portsm'th	Humphrys	1896	885,037	H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 2 l.	5 (4 sub.)	17·5	1850	757
b. 1st cl.	**Prince of Wales**	S.	1500	400	0	75	0	26	9	2	20,000	Chatham	Greenock Foundry	Bldg.	..	9	12	12–6	2–1	4 12-in., 8·75-in. Q.F., 10 6-in., 16 12-pr., 2 8-cwt., 6 3-pr, 8·45-in. M G.	4	19	..	..
b. 1st cl.	**Queen** . .	S.	1500	400	0	75	0	26	9	2	20,000	Dev'port .	Harland & Wolf	Bldg.	..	9	12	12–6	2–1	4 12-in, 8·75-in. Q.F., 10 6-in., 16 12-pr., 2 8-cwt., 6 3-pr., 8 45-in. M.G.	4	19	..	..
b. 1st cl.	**Renown** .	S. shd.	12,350	380	0	72	0	26	9	2	12,000	Pembroke	Maudslay	1896	696,425	8–6 H. S.	10–6 H. S.	10 H. S.	.. 3–2	4 10-in. 29-ton, 10 6-in. Q.F., 14 12-pr., 15 smaller Q.F. and Machine Guns.	5 (2 sub.)	18·0	1800	674
b. 1st cl.	**Ramillies** .	S.	14,150	380	0	75	0	27	6	2	13,000	Glasgow	Thomson	1893	874,255									
b. 1st cl.	**Repulse** .	S.	14,150	380	0	75	0	27	6	2	13,000	Pembroke	Humphrys	1894	841,274	18–5 *comp.*	16 *comp.*	17 *comp.*	.. 3	4 13·5in., 10 6-in. Q.F., 16 6-pr., 12 3-pr., 8 M., 2 l.	7 (2 sub.)	17·5	1800	730
b. 1st cl.	**Resolution** .	S.	14,150	380	0	75	0	27	6	2	13,000	Jarrow	Palmer	1893	852,755									

* Details of cost incomplete

x Includes Hydraulic Machinery, Gun Mountings, &c.

GREAT BRITAIN.—Armoured Ships - *continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour.				Armament.		Speed.	Normal Coal Supply.	Complement.
																Side.	Bulkhead	Gun Position	Backing. Deck Plating.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.	no.					£	in.	in.	in.	in.			knots.	tons.	
b. 1st cl.	Revenge	S.	14,150	380	0	75	0	27	6	2	13,000	Jarrow	Palmer	1895	852,755									
b. 1st cl	Royal Oak	S.	14,150	380	0	75	0	27	6	2	13,000	Birkenh'd	Laird	1894	877,378	18–5 *comp.*	16 *comp.*	17 *comp.*	.. 3	4 13·5-in., 10 6-in. Q.F., 16 6-pr., 12 3-pr., 8 M., 2 l.	7 (2 sub.)	17·5	900 1800	730
b. 1st cl.	Royal Sovereign	S.	14,150	380	0	75	0	27	6	2	13,312	Portsm'th	Humphrys	1892	824,583									
b. 1st cl.	Rodney	S.	10,300	325	0	68	0	27	3	2	11,500	Chatham	Humphrys	1888	669,278	18 *comp.*	16 *comp.*	11 *comp.*	15–12 3–2½	4 13·5 in., 6 6-in. Q.F., 12 6-pr., 10 3-pr., 6 M., 2 l.	4	16·75	1200	515
c.d.s. *t.*	Rupert	I.	5440	250	0	53	0	23	7	2	6000	Chatham	Portsm'th	1874	232,677	11–9	12	14–12	14–10 3–2	2 9·2-in., 2 6-in. Q.F., 4 6-pr., 6 3-pr., 2 M., 2 l.	4	14·0	480	293
b. 1st cl.	Russell	S.	14,000	405	0	75	6	26	6	2	18,000 B	Jarrow	Palmer	Bl'g.	‡	7 K.S.	..	11–6 K.S.	4·6 2–1	4 12-in., 12 6-in. B.L., 12 12-pr. Q.F., 6 3-pr.	4	19	900 2000	750
t. 1st cl.	Sans Pareil	I.	10,470	340	0	70	0	27	3	2	14,000	Blackwall	Humphrys	1889	x 719,442	16–18 *comp.*	16 *comp.*	18 *comp.*	6 3	2 16·25in., 1 10-in., 12 6-in. Q.F., 12 6-pr., 12 3-pr., 8 M., 2 l.	6 (2 sub.)	17·2	1200	583
a.c.	Suffolk	S.	9800	440	0	66	0	24	6	2	22,000 Nic.	Portsm'th	Humphrys	Bldg	..	4–2	3	4	2–¾	14 6-in. Q.F., 10 12-pr., 3 3-pr., 9 M.G.	2	23	1600 800	800
c.b. 3rd c.	Sultan	I.	9290	325	0	59	0½	27	6	1	8000	Chatham	Thomson	1871	357,415	9–6	6–4½	9–8	12–10	8 10-in. M.L.R., 4 9-in.do., 4 4·7-in. Q.F., 9 6-pr., 13 3-pr., 7 M., 2 l.	4	14·0	810	661
c.b. 2nd c.	Superb	I.	9170	332	3	59	0	26	5	1	8500	Blackwall	Maudslay	1880	443,000 (purchas'd)	12–10	10–5	10	7–12 1½	12 10-in. M.L.R., 10 6-in. Q.F., 22 light Q.F. and Machine Guns.	4	15·0	970	654
a.c.	Sutlej	S. shd.	12,000	440	0	69	6	26	3	2	21,000 B	Clydeb'nk	Clydebank Company	Bldg.	733,625	6 K.S.	5 K.S.	6 K.S.	.. 3–2	2 9·2-in. 12 6-in. B.L., 17 small Q.F.	2	21·0	800 1600	615

c.b. & b 2nd	**Temeraire**	I. shd.	8540	285	0	62	0	27	2	2	6500	Chatham	Humphrys	1877	454,969	11–8	8–5	10–8	12–10 1½–1	4 11-in. M.L.R., 4 10-in. do., 6 4-in. Q.F., 4 6-pr., 10 3-pr., 8 M., 4 l.	2	13·8	620	592
t. 2nd c.	**Thunderer**	I.	9330	285	0	62	3	27	0	2	7000	Pembroke	Maudslay	1877	358,542	12–10	12–10	14–12	18–16 3–2	4 10-in., 6 6-pr. Q.F., 8 3-pr., 4 M., 2 l.	2	14·0	1600	592
t. 1st cl.	**Trafalgar**	S.	11,940	345	0	73	0	27	6	2	12,000	Portsm'th	Humphrys	1890	862,794 x	20–16 comp.	18–14 comp.	18 comp.	6 3	4 13·5 in., 6 6-in. Q.F., 8 6-pr., 12 (2 sub.) 3-pr., 6 M., 3 l.	6	16·7	1200	572
a.c.	**Undaunted**	S.	5600	300	0	56	0	22	6	2	8500	Jarrow	Palmer	1889	256,055	10 comp.	16 comp.	4½ comp.	6 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3-pr., 7 M., 3 l.	4	18·1	750 900	484
b. 1st cl.	**Victorious**	S.	14,900	390	0	75	0	27	6	2	12,000	Chatham	Hawthorn	1897	868,313	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 (4 sub.) 3-pr., 8 M., 2 l.	5	17·5	1850	757
b. 1st cl.	**Venerable**	S.	15,000	400	0	75	0	26	9	2	15,000 B	Chatham	Maudslay	Bldg.	1,010,863	7 K S.	..	11–6 K.S.	4–6 2–1	4 12-in., 24 small B.L., Q.F., 8 M.	2	18·0	900 2000	755
b. 1st cl.	**Vengeance**	S.	12,950	390	0	74	0	26	0	2	13,500 B	Barrow	Vickers	Bldg	814,619	6 H.N.S.	12 H.N.S.	12–6 H.S.	4 2–1	4 12-in., 12 6-in. Q.F. & 18 small Q.F.	4	18·25	800 1850	750
a.c.	**Warspite**	S.	8400	315	0	62	0	27	4	2	10,000	Chatham	Penn	1888	529,332	10 comp.	9 comp.	8 comp.	10 3–2	4 9·2-in., 10 6-in. Q.F., 4 6-pr. Q.F., 9 3-pr., 6 M., 2 l.	6	16·7	1130	535
c.d.s.	**Wivern**	I.	2750	224	6	42	4	17	0	1	1000	Birkenh'd	Laird	1865	116,514	4½	.		8–10	4 9-in. M.L.R., 8 M., 1 l.	..	8·5	300	151
b.	3 new ships (Programme.)	S.	Design not settled.††																					
a.c.	6 new ships (Programme.)	S.	„ „ „ ‡‡																					

The following, which appear in the Official Navy List, are lent to India and Australia:—

c.d.s. t.	**Abyssinia*** (*Indian Marine.*)	I.	2900	225	0	42	0	14	6	2	900	Poplar	Dudgeon	1870	116,549	7–6	8–7	10–8	11–9 1½–1	4 8-in. 14-ton, 7 M., 2 l.	..	9·0	92	193
c.d.s. t.	**Cerberus†** (*Victorian Marine.*)	I.	3480	225	0	45	0	15	3	2	1660	Jarrow	Maudslay	1870	117,556	8–6	9–8	10–9	11–9 1–1½	4 10-in. 18-ton M.L.R., 4 M.	..	9·75	120	196
c.d.s. t.	**Magdala*** (*Indian Marine.*)	I.	3340	225	0	45	0	15	3	2	1400	Blackwall	Ravenhill	1870	132,400	8–6	9–8	10–9	11–9 1½–1	4 8-in. 14-ton, 7 M., 2 l.	..	10·0	120	194

x Includes Hydraulic Machinery, Gun Mountings, &c.
†† One at Portsmouth, one at Devonport, and one by contract.
* At Bombay.
‡‡ One at Chatham, five by contract.
† At Melbourne.

GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tns	ft.	in.	ft.	in.	ft.	in.	no.					£	in.	in.			knots.	tons.	
2nd cl. Cr.	Æolus	S. shd.	3600	300	0	43	0	17	6	2	9000	Devonp'rt	Hawthorn	1892	208,450	2	2–1	2 6-in. Q.F., 6 4·7-in. 8 6-pr. 1 3-pr., 4 M., 1 l.	4	19·75	400	273
Dsp. Ves.	Alacrity	S.	1700	250	0	32	6	14	0	2	3000	Jarrow	Palmer	1885	77,969	..	..	10 6-pr. Q.F., 2 M.	..	17·00	400	114
T. G. B.	Alarm	S.	810	230	0	27	0	8	9	2	3884	Sheerness	Penn	1892	59,346	2	..	2 4·7-in. Q.F., 4 3-pr. do.	3	19·25	100	91
2nd cl. G. B.	Albacore	C.	560	135	0	26	0	10	6	1	500	Birkenh'd	Laird	1883	28,556	..	..	2 5-in., 2 4-in., 2 M.	..	11·0	85	59
Sloop	Alert	S. shd.	960	180	0	32	6	11	6	1	1400	Sheerness	Sheerness	1894	60,309	..	..	6 4-in. 25-pr. Q.F., 4 3-pr., 2 M.	..	13·25	130	101
"	Algerine	S.	1050	185	0	32	6	11	3	2	1400	Devonp'rt	Devonport	1895	63,904	·22	..	6 4-in. 25-pr. Q.F., 4 3-pr., 3 M.	..	13·0	160	106
2nd cl. Cr.	Amphion	S.	4300	300	0	46	0	20	6	2	5000	Pemb ro	Maudslay	1883	160,500	..	1½	10 6-in. Q.F., and 14 smaller, and M.	4	16·6	550 / 1000	309
" "	Andromache	S.	3400	300	0	43	0	16	6	2	9000	Chatham	Earle	1890	186,280							
" "	Apollo	S.	3400	300	0	43	0	16	6	2	9000	Chatham	Earle	1891	186,361	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
1st cl. Cr.	Andromeda	S. shd.	11,000	435	0	69	0	25	3	2	16,500 B	Pembroke	Hawthorn	1897	575,146	3	3–6	16 6-in., 17 small Q.F., 2 12-pr. boat.	3 (2 sub)	20·5	1000	600
T. G. B.	Antelope	S.	810	230	0	27	0	8	9	2	3621	Devonp'rt	Yarrow	1893	61,397	2	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
3rd cl. Cr.	Archer	S.	1770	225	0	36	0	14	6	2	3500	Glasgow	Thomson	1885	x87,583	..	..	6 6-in. Q.F., 8 3-pr., 2 M., 1 l.	3	16 5	475	172

1st cl. Cr.	Argonaut	S. shd.	11,000	435	0	69	0	25	3	2	18,000 B	Fairfield	Fairfield	1898	535,557							
" "	Ariadne	S. shd.	11,000	435	0	69	0	25	3	2	18,000 B	Clydeb'nk	JohnBrown	1898	543,705	3–6 H. S.	4	16 6-in. Q.F., 14 12-pr., 11 smaller Q.F., and Machine Guns.	3 (2 sub.)	20·75	1000	677
" "	Amphitrite	S. shd.	11,000	435	0	69	0	25	3	2	18,000 B	Barrow	Vickers	1898	546,227							
2nd cl. Cr.	Arethusa	S.	4300	300	0	46	0	20	6		5000	Glasgow	Napier	1882	145,198		1½	10 6-in. Q.F., 8 3-pr., 6 M., 2 l.	4	16·6	1000*	309
" "	Arrogant	S.	5800	320	0	57	6	21	0	2	10,000 B	Devonp'rt	Earle	1896	278,878	3 N.S.	1–2 N.S.	4 6-in., Q.F., 6 4·7-in., 9 12-pr., 3 3-pr, 1 12-pr. boat, 5 M.	2	19·1	500	480
" "	Astræa	S. shd.	4360	320	0	49	6	19	0	2	9112	Devonp'rt	Devonport	1893	244,831	2	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr. 1 3-pr., 4 M., 1 l.	4	19·75	400	312
3rd cl. Cr.	Barham	S.	1830	280	0	35	0	13	3	2	4700 T	Portsm'th	Hawthorn	1889	113,302	2	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	18·6	140	169
" "	Bellona	S.	1830	280	0	35	0	13	3	2	4700 T	Newcastle	Hawthorn	1890	94,195	2	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	17·8	140	169
" "	Barracouta	S.	1580	220	0	35	0	14	0	2	3000	Sheerness	Palmer	1889	96,315	2	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	16·5	160	159
" "	Barrosa	S.	1580	220	0	35	0	14	0	2	3000	Portsm'th	Palmer	1889	79,238	2	2–1	6 4·7-in. Q.F., 4 3-pr., 3 M.	2	16·5	160	159
" "	Blanche	S. shd.	1580	220	0	35	0	14	0	2	3000 L	Pembroke	Laird	1889	91,112	2	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	16·5	160	159
" "	Blonde	S. shd.	1580	220	0	35	0	14	0	2	3000 L	Pembroke	Laird	1889	90,059	2	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	16 5	160	159
Sloop	Basilisk	S. shd.	1170	195	0	28	0	12	6	2	2000	Sheerness	Rennie	1889	58,013							
"	Beagle	S. shd.	1170	195	0	28	0	12	6	2	2000	Portsm'th	Rennie	1889	56,474	..	..	8 5-in., 8 M.	..	14·7	160	138
1st cl. Cr.	Blake	S.	9000	375	0	65	0	25	9	2	20,000	Chatham	Maudslay	1889	440,471							
" "	Blenheim	S.	9000	375	0	65	0	25	9	2	21,411	Blackwall	Humphrys	1890	425,591	6	6–3	2 9·2-in., 10 6-in. Q.F., 16 3-pr Q.F., 7 M., 2 l.	4 (2 sub.)	21·5	1500	570

* Includes Gun Mountings, &c.

* Bunker capacity.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
2nd cl. Cr.	**Bonaventure**	S. shd	4360	320 0	49 6	19 0	2	9000	Devonp'rt	Hawthorn	1892	247,128	2	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr. 4 M., 1 l.	4	19·5	400	312
T. G. B.	**Boomerang** (Australia)	S.	735	230 0	27 0	8 3	2	3500	Elswick	Bellis	1889	49,962	2	..	2 4·7-in. Q.F., 4 3-pr., 1 M.	3	20·0	100	91
2nd cl. Cr.	**Brilliant**	S. shd.	3600	300 0	43 8	17 6	2	9164	Sheerness	Hawthorn	1891	204,228	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·7	400	273
3rd cl. Cr.	**Brisk**	S.	1770	225 0	36 0	14 3½	2	3500	Glasgow	Thomson	1886	87,583	..	..	6 6-in. Q.F., 8 3-pr., 2 M., 1 l.	3	16·5	325	172
1st cl. G. B.	**Bramble**	S.	700	180 0	33 0	8 0	2	1300 Y	Liverpool	Fawcett & Co.	1898	50,461	..	..	2 4-in., 4 12-pr. Q.F.	..	13·5	50	85
„ „	**Britomart**	S.	700	180 0	33 0	8 0	2	1300 Y	Liverpool	Fawcett & Co.	1898	50,401	..	..	2 4-in., 4 12-pr. Q.F.	..	13·5	50	85
Sloop	**Buzzard**	C.	1140	195 0	28 0	11 6	2	2000	Sheerness	Barrow	1887	58,700	..	..	8 5-in., 8 M.	2	14·50	160	138
3rd cl. Cr.	**Calliope**	S. shd.	2770	235 0	44 6	19 11	1	4020	Portsm'th	Rennie	1884	120,000	..	1½	4 6-in., 12 5-in. 38 cwt., 9 M., 2 l.	2	14·6	550	293
„ „	**Calypso**	S. shd.	2770	235 0	44 6	19 11	1	4000	Chatham	Rennie	1883	119,500							
2nd cl. Cr.	**Cambrian**	S. shd.	4360	320 0	49 6	19 0	2	9000	Pembroke	Hawthorn	1893	236,919	2	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·5	400	312
2nd cl. Cr.	**Challenger**	S.	5880	355 0	56 0	21 3	2	12,500 B & W	Chatham	Wallsend Eng'ng Co.	Blg.	..	..	..		..			
3rd cl. Cr.	**Champion**	S. shd.	2380	225 0	44 6	19 3	1	2000	Glasgow (Fairfield)	Elder	1878	113,983	..	1½	4 6-in., 8 5-in., 4 3-pr., Q.F., 6 M., 2 l.	2	12·75	470	265

3rd cl. Cr.	**Cleopatra**	S. shd.	2380	225	0	44	6	19	3	1	2000	Glasgow (Fairfield)	Humphrys	1878	113,924	..	1½	4 6-in., 8 5-in., 4 3-pr. Q.F., 6 M., 2 l.	2	13·0	470	265
,, ,,	**Comus**	S. shd.	2380	225	0	44	6	19	3	1	2000	Glasgow (Fairfield)	Elder	1878	113,974	..	1½	10 6-in., 7 M., 2 l.	2	12·75	470	265
,, ,,	**Cordelia**	S. shd.	2380	225	0	44	6	19	3	1	2000	Portsm'th	Rennie	1881	104,500	..	1½	10 6-in., 9 M., 2 l.	2	12·75	470	265
Sloop	**Condor**	S. shd.	980	180	0	33	3	11	6	2	1400 B	Sheerness	Thames	1898	65,185	..	..	6 4-in. Q.F., 4 3-pr.	..	13·25	130	130
2nd cl. Cr.	**Charybdis**	S. shd.	4360	320	0	49	6	19	0	2	9000	Sheerness	Earle	1893	237,344	2	2–1	2 6-in. Q.F., 8 4·7-in, 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·5	400	312
T. G. B.	**Circe**	S.	810	230	0	27	0	8	9	2	3500	Sheerness	Penn	1892	61,979	2	..	2 4·7-in. Q.F., 4 3-pdr.	3	19·25	100	91
2nd cl. G. B.	**Cockchafer**	C.	465	125	0	23	6	9	6	1	360	Pembroke	Maudslay	1881	77,000	..	..	2 64-pr. M.L.R., 2 20-pr., 2 M.	..	9·8	40	61
3rd cl. Cr.	**Cossack**	S	1770	225	0	36	0	14	3½	2	3500	Glasgow	Thomson	1886	*x* 87,583	..	..	6 6-in. Q.F., 8 3-pr., 2 M., 1 l.	3	16·5	325	172
1st cl. Cr.	**Crescent**	S. shd.	7700	360	0	60	0	23	9	2	12,000	Portsm'th	Penn	1892	383,068	6	5–1	1 9·2-in., 12 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	19·7	850	560
3rd cl. Cr.	**Curaçoa**	S. shd.	2380	225	0	44	6	19	3	1	2000	Glasgow (Fairfield)	Humphrys	1878	112,931	..	1½	4 6-in., 8 5-in., 1 3-pr. Q.F., 9 M., 2 l.	2	13·0	470	265
G. V.	**Curlew**	S.	950	195	0	28	0	10	6	2	1200	Devonp'rt	Penn	1885	*x* 49,963	..	..	1 6-in. 3 5-in., 7 light Q.F. and M.	1	14·5	250	103
Sloop	**Daphne**	C.	1140	195	0	28	0	11	6	2	2000	Sheerness	Greenock F'ndry Co.	1888	*x* 57,600	..	..	8 5-in., 8 M.	..	14·0	160	138
1st cl. Cr.	**Diadem**	S. shd.	11,000	435	0	69	0	26	0	2	16,500 B	(Fairfield)	Fairfield	1896	550,127	4½–2	4–2½	16 6-in. Q.F., 14 12-pr., 11 light Q.F. and M.	3 (2 sub.)	20·5	1000	600
2nd cl. Cr.	**Diana**	S. shd.	5600	350	0	54	0	21	0	2	9600	(Fairfield)	Fairfield	1895	249,332							
,, ,,	**Dido**	S. shd.	5600	350	0	54	0	21	0	2	9600	Glasgow	London and Glasgow Co.	1896	252,278	3	2½	5 6-in. Q.F., 6 4·7-in., 1 12 pr., 11 smaller Q.F. and M.	3 (2 sub.)	19·5	550	470
,, ,,	**Doris**	S. shd.	5600	350	0	54	0	21	0	2	9600	Barrow	Barrow	1896	254,029							
T. G. B.	**Dryad**	S.	1070	250	0	30	6	9	0	2	3500	Chatham	Maudslay	1893	73,491	2	..	2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120

x Includes Gun Mountings, &c.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
1st cl. G. B.	Dwarf	S.	700	180 0	33 0	8 0	2	1300 Y	Glasgow	London and Glasgow Co.	1898	51,139		..	2 4-in. Q.F., 4 12-pr.	..	13.5	50	85
2nd cl. Cr.	Eclipse	S. shd.	5600	350 0	53 0	20 3	2	9600	Portsm'th	Portsm'th	1894	279,345	3	1½–3	5 6-in. Q.F., 6 4·7-in., and 15 smaller, 4 M., 1 12-pr. boat.	3 (2 sub.)	19·5	550	477
1st cl. Cr.	Edgar	S.	7350	360 0	60 0	23 9	2	12,000	Devonp'rt	Fairfield	1890	401,083	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·5	850	544
2nd cl. Cr.	Encounter	S.	5800	355 0	56 0	21 3	2	12,500 B	Devonp'rt	Keyham	Bldg.	..	..	..		..	..	..	..
1st cl. Cr.	Endymion	S.	7350	360 0	60 0	23 9	2	12,000	Hull	Earle	1891	350,459	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7. M, 2 l.	4 (2 sub.)	20·5	850	544
Sloop	Egeria	C.	940	160 0	31 4	14 3	1	700	Pembroke	Humphrys	1873	42,882	..	..	4 20-pr., 2 M., 1 l.	..	11·3	100	122
”	Espiègle	S. shd.	1070	185 0	33 0	11 3	2	1400 B & W	Sheerness	Wallsend Slipway Co.	Bldg.	‡	..	..	6 4-in. Q.F., 4 3-pr.	..	13·25	160	160
1st cl. Cr.	Europa	S. shd.	11,000	435 0	69 0	26 0	2	16,500 B	Clydeb'nk	Thomson	1897	561,126	4½–2	4–2½	16 6-in. Q.F., 14 12-pr., 11 light Q.F. and Machine Guns.	3 (2 sub.)	20·5	1000	600
Sloop	Fantôme	S. shd.	1070	185 0	33 0	11 3	2	1400 B	Sheerness	Devonport	Bldg.	‡	..	..	6 4-in. Q.F., 4 3-pr.	...	13·25	160	160
3rd cl. Cr.	Fearless	S.	1580	220 0	34 3	14 6	2	3200	Barrow	Barrow	1886	x 87,452	..	..	4 4·7-in. Q.F., 8 3-pr., 2 M., 1 l.	3 (1 sub.)	16·7	450	147
2nd cl. G. B.	Firebrand	C.	455	125 0	23 6	10 0	1	360	Glasgow	Thomson	1877	22,800	..	..	2 5-in., 2 4-in., 2 M.	..	10·17	40	61
2nd cl. Cr.	Flora	S. shd.	4360	320 0	49 6	19 0	2	9000	Pembroke	Barrow	1893	241,819	2	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·5	400	312
” ”	Forte	S. shd.	4360	320 0	49 6	19 0	2	9000	Chatham	Chatham	1893	240,816							
” ”	Fox	S. shd.	4360	320 0	49 6	19 0	2	9000	Portsm'th	Portsm'th	1893	244,078							
” ”	Forth	S.	4050	300 0	46 0	20 0	2	5700	Pembroke	Hawthorn	1886	201,952	2	3–2	2 8-in., 10 6-in. Q.F., 3 6-pr., 8 3-pr., 6 M., 2 l.	2	16·8	900	326

2nd cl. Cr.	**Furious**	S. shd.	5800	320	0	57	6	21	0	2	10,000 B	Devonp'rt	Earle	1896	280,772	3	1–2	4 6-in. Q.F., 6 4·7 in., 9 12-pr., 3 3-pr., 1 12-pr. boat, 5 M.	2	19·0	500	480
„ „	**Gladiator**	S. shd.	5750	320	0	57	6	21	0	2	10,000 B	Portsm'th	Maudslay	1896	287,642							
1st cl. Cr.	**Gibraltar**	S. shd.	7700	360	0	60	0	23	9	2	12,000	Glasgow	Napier	1892	347,634	6	5–1	2 9·2-in., 10 6-in. Q.F. 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	19·7	850	544
T. G. B.	**Gleaner**	S.	735	230	0	27	0	8	3	2	3600	Sheerness	Sheerness	1890	63,798	2	..	2 4·7-in. Q.F., 4 3-pr.	3	19·0	100	91
„	**Gossamer**	S.	735	230	0	27	0	8	3	2	3600	Sheerness	Sheerness	1890	54,490							
1st cl. G. B.	**Goldfinch**	C.	805	165	0	31	0	11	7½	1	1200	Sheerness	Sheerness	1889	40,889	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
1st cl. Cr.	**Grafton**	S.	7350	360	0	60	0	23	9	2	12,000	Blackwall	Humphrys	1892	351,851	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·0	850	560
T. G. B.	**Grasshopper**	S.	525	200	0	23	0	8	9	2	2700	Sheerness	Maudslay	1887	34,065 x	..	..	1 4-in., 6 3-pr. Q.F.	4	17·0	80	67
„	**Halcyon**	S.	1070	250	0	30	6	9	0	2	3500	Devonp'rt	Hawthorn	1894	75,091	2		2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120
„	**Harrier**	S.	1070	250	0	30	6	9	0	2	3500	Devonp'rt	Hawthorn	1894	73,428							
1st cl. Cr.	**Hawke**	S.	7350	360	0	60	0	23	9	2	12,000	Chatham	Fairfield	1891	365,491	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·0	850	544
T. G. B.	**Hazard**	S.	1070	250	0	30	6	9	0	2	3500	Pembroke	Fairfield	1894	74,076	2		2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120
„	**Hebe**	S.	810	230	0	27	0	8	9	2	3566	Sheerness	Sheerness	1892	73,433	2		2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
T. D. S.	**Hecla**	I.	6400	391	7	38	9	24	3	1	2400	Belfast	Harland & Wolff	1878	126,190	..		4 7·5-in., 14 M.	4	13·0	2,200	277
2nd cl. Cr.	**Hermes**	S. shd.	5600	350	0	54	0	20	6	2	10,000 B	Fairfield	Fairfield	1898	278,349	3	1½–3	11 6-in. Q.F., 15 smaller Q.F.	..	20·0	600	477
„ „	**Highflyer**	S. shd.	5600	350	0	54	0	20	6	2	10,000 B	Fairfield	„	1898	278,186							
„ „	**Hyacinth**	S. shd.	5600	350	0	54	0	20	6	2	10,000 B	Glasgow	London and Glasgow Co.	1898	282,761							
„ „	**Hermione**	S. shd.	4360	320	0	49	6	19	0	2	9000	Devonp'rt	Thomson	1893	223,267	2	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr. 4 M., 1 l.	4	19·5	400	312

‡ Details not yet complete.

x Includes Gun Mountings, &c.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.					£	in.	in.			knots.	tons.	
T. G. B. .	Hussar .	S.	1070	250	0	30	6	9	0	2	3500	Devonp'rt	Hawthorn .	1894	72,886	2	..	2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120
Sloop .	Icarus .	C.	970	167	0	32	0	13	6	1	1200	Devonp'rt	Barrow .	1885	*x* 52,104	..	..	8 5-in., 4 3-pr. Q.F., 4 M. 1 l.	..	12·2	150	126
2nd cl. Cr.	Indefatigable .	S. shd.	3600	300	0	43	8	17	6	2	9000	Glasgow .	London and Glasgow Co.	1891	181,024							
„ „	Intrepid .	S. shd.	3600	300	0	43	8	17	6	2	9000	Glasgow .	London and Glasgow Co.	1891	181,157	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	273
„ „	Iphigenia .	S shd.	3600	300	0	43	8	17	6	2	9000	Glasgow .	London and Glasgow Co.	1891	181,879							
„ „	Iris . .	S.	3730	300	0	46	0	22	0	2	6000	Pembroke	Maudslay .	1877	213,186	..	..	13 5-in., 4 3-pr. Q.F., 8 M., 1 l.	3	18·0	780	450
„ „	Isis . .	S. shd	5600	350	0	54	0	21	0	2	9600	Glasgow .	London and Glasgow Co.	1896	252,067	3	$2\frac{1}{2}$	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 11 lighter Q.F. and M.	4 (2 sub.)	20·0	550	470
„ „	Juno . .	S. shd.	5600	350	0	54	0	21	0	2	9600	Barrow .	Barrow .	1895	254,097							
T. G. B. .	Jaseur .	S.	810	230	0	27	0	8	9	2	3711	Barrow .	Barrow .	1892	48,238	2	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
„ .	Jason .	S.	810	230	0	27	0	8	9	2	3540	Barrow .	Barrow .	1892	49,253 *x*							
„ .	Karrakatta (Australia) .	S.	735	230	0	27	0	8	3	2	3500	Elswick .	Bellis .	1890	47,619	2	..	2 4·7-in. Q.F., 4 3-pr.	3	20·0	100	91

3rd cl. Cr.	Katoomba (Australia)	.	2575	265	0	41	0	15	6	2	7500	Elswick	Hawthorn	1889	116,719	2	2–1	8 4·7-in. Q.F., 8 3-pr. 4 M., 1 l.	4	19·0	300	217
G. V.	Landrail	S.	950	195	0	28	0	10	6	2	1200	Devonp'rt	Penn	1886	49,963	..	..	1 6-in., 3 5-in., 4 3-pr. Q.F., 3 M.	..	14·5	250	46
1st cl. G. B.	Lapwing	C.	805	165	0	31	0	11	7½	2	1200	Devonp'rt	Devonport	1889	39,952	..	..	6 4-in. 25-cwt., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
2nd cl. Cr.	Latona	S.	3400	300	0	43	0	16	6	2	9000	Barrow	Barrow	1890	171,068	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
" "	Leander	S.	4300	300	0	46	0	20	6	2	5000	Glasgow	Napier	1882	148,453	..	1½	10 6-in. Q.F., 14 lighter Q.F., and M.	4	16·6	550 1000	309
T. G. B.	Leda	S.	810	230	0	27	0	8	9	2	3597	Sheerness	Penn	1892	62,145	2	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
G. V.	Linnet	C.	756	165	0	29	0	10	11	2	870	Blackwall	Rennie	1880	35,663	..	..	2 90-cwt. M.L.R., 4 6-pr. Q.F., 2 M.	..	11·80	180	92
1st cl. G. B.	Lizard	C.	715	165	0	29	0	11	10	1	1000	Belfast	Harland	1886	52,770	..	..	6 4-in., 4 M.	..	13·0	105	76
3rd cl. Crs.	Magicienne, Marathon	S. shd.	2950	265	0	42	0	17	6	2	9000	Glasgow (Fairfield)	Hawthorn	1888	136,000	..	1½	6 6-in. Q.F., 9 6-pr., 1 3-pr., 3 M., 1 l.	4	19·0	400	218
1st cl. G. B.	Magpie	C.	805	165	0	31	0	11	7½	1	1200	Pembroke	Earle	1889	*38,700	..	..	6 4-in., 4 M.	..	13·0	105	76
3rd cl. Crs.	Medea, Medusa	S.	2800	265	0	41	0	16	6	2	9000	Chatham	Humphrys	1888	*141,700	..	1½	6 6-in. Q.F., 9 6-pr., 1 3-pr., 3 M., 1 l.	4	19·0	400	218
2nd cl. Cr.	Melampus	S.	3400	300	0	43	0	16	6	2	9000	Barrow	Barrow	1890	171,635	2	2–1	2 6-in. Q.F., 6 4·7 in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
Sloop	Melita	C.	970	167	0	32	0	13	6	1	1200	Malta	Malta Dock Yard	1888	60,179	..	..	8 5-in., 8 M., 1 l.	..	12·50	150	125
3rd cl. Cr.	Melpomene	S. shd.	2950	265	0	41	0	17	6	2	9000	Portsm'th	Palmer Co.	1888	*142,000	..	1½	6 6-in. Q.F., 9 6-pr., 1 3-pr., 3 M., 1 l.	4	19·0	400	218
2nd cl. Cr.	Mercury	S.	3730	300	0	46	0	20	2	2	6000	Pembroke	Maudslay	1878	213,252	..	..	13 5-in., 12 light Q.F., and M.	4	16·8	780	291
Sloop	Merlin	S. shd.	1070	185	0	33	0	11	3	2	1400 Nic.	Sheerness	Devonport	Bldg.	‡	..	..	6 4-in. Q.F., 4 3-pr.	..	13·25	160	160

* Includes Gun Mountings, &c. ‡ Details not yet complete.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.					£	in.	in.			knots.	tons.	
2nd cl. Cr.	Mersey	S.	4050	300	0	46	0	19	6	2	6000	Chatham	Humphrys	1885	154,000	4	3–2	2 15-ton, 10 6-in. Q.F., 3 6-pr., 8 3-pr., 5 M., 2 l.	4	17·3	900	327
3rd cl. Cr.	Mildura (Australia)	S.	2575	265	0	41	0	15	6	2	7500	Elswick	Hawthorn	1889	116,062	2	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	4	19·0	300	217
2nd cl. Cr.	Minerva	S. shd.	5600	350	0	53	0	20	6	2	9600	Chatham	Chatham	1895	244,046	3	1½–3	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 11 smaller Q.F., and M.	3 (2 sub.)	20·3	550	437
3rd cl. Cr.	Mohawk	S.	1770	225	0	36	0	14	6	2	3500	Glasgow	Thomson	1886	x 87,583	..	..	6 6-in. Q.F., 8 3-pr., 2 M., 1 l.	3	16·5	475	172
Sloop	Mutine	S.	980	180	0	33	0	11	6	2	1400 B	Laird	Laird	Bldg.	63,204	..	..	6 4-in. Q.F., 4 3-pr.	..	13·25	130	130
2nd cl. Cr.	Naiad	S.	3400	300	0	43	0	16	6	2	9000	Barrow	Barrow	1890	171,445	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
1st cl. Cr.	Niobe	S. shd.	11,000	435	0	69	0	26	0	2	16,500 B	Barrow	Vickers	1897	552,692	4½–2	4–2½	16 6-in. Q.F., 14 12-pr., 11 light Q.F., and M.	3 (2 sub.)	20·5	1000	600
Sloop	Nymphe	C.	1140	195	0	28	0	12	6	1	2000	Portsm'th	Greenock F'ndry Co.	1888	x 57,600	..	..	8 5-in., 8 M.	..	14·0	160	138
T. G. B.	Niger	S.	810	230	0	27	0	8	9	2	3784	Barrow	Barrow	1892	48,177	2	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
Sloop	Odin	S. shd.	1070	185	0	33	0	11	3	2	1400 B & W	Sheerness	Devonport	Bldg.	‡	..	..	6 4-in. Q.F., 4 3-pr.	..	13·25	160	160
T. G. B.	Onyx	S.	810	230	0	27	0	8	9	2	3548	Birkenh'd	Laird	1892	53,961	2	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
3rd cl. Cr.	Pallas	S.	2575	265	0	41	0	15	6	2	7610	Portsm'th	Hawthorn	1890	148,828	2	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	4	19·25	300	217
„ „	Pearl	S.	2575	265	0	41	0	15	6	2	7500	Pembroke	Earle	1888	151,693							
1st cl. G. B.	Partridge	C.	755	165	0	30	0	11	4	1	1200	Devonp'rt	Devonport	1888	37,800	..	..	6 4-in., 4 M.	..	13·25	105	76
„ „	Peacock	C.	755	165	0	30	0	11	4	1	1200	Pembroke	Barrow Co.	1872	37,600							

3rd cl. Cr.	**Pactolus**	S.	2135	300		36	6	17	0	2	7000 Bl	Elswick	Penn	1897	139,736							
" "	**Pandora**	S.	2200	305		36	9	13	6	2	7000 T	Portsm'th	Portsm'th	1900	165,046							
" "	**Pegasus**	S.	2135	300		36	6	17	0	2	7000 R	Jarrow	Palmer	1897	135,071							
" "	**Pelorus**	S.	2135	300		36	6	17	0	2	7000 Nor.	Sheerness	Thomson	1896	164,840							
" "	**Perseus**	S.	2135	300		36	6	13	6	2	7000 T	Hull	Earle	1898	127,992							
" "	**Pioneer**	S.	2200	305		36	9	13	6	2	7000 T	Chatham	Fairfield	1899	149,080	·22	2	8 4-in., 8 3-pr. Q.F., 2 l.	2	20·0	250	224
" "	**Pomone**	S.	2135	300		36	6	13	6	2	7000 Bl	Sheerness	Penn	1897	149,568							
" "	**Prometheus**	S.	2135	300		36	6	13	6	2	7000 T	Hull	Earle	1898	127,975							
" "	**Psyche**	S.	2200	305		36	9	17	6	2	7000 T	Devonp'rt	Devonport	1898	155,563							
" "	**Proserpine**	S.	2135	300		36	6	17	0	2	7000 T	Sheerness	Devonport	1896	159,136							
" "	**Pyramus**	S.	2135	300		36	6	13	6	2	7000 R	Jarrow	Palmer	1898	135,096							
Sloop (Surveying)	**Penguin**	C.	1130	170	0	36	0	16	1	1	700	Glasgow	Hawthorn	1876	52,111	..	..	2 64-pr. M.L.R., 2 M., 1 l.	..	11·0	150	145
2nd cl. Cr.	**Phaeton**	S.	4300	300	0	46	0	20	6	2	5000	Glasgow	Napier	1883	145,198	..	1½	10 6-in. Q.F., 14 light Q.F., and M.	4	16·6	550 1000	309
1st cl. G. B.	**Pheasant**	C.	755	165	0	29	0	11	4	1	1200	Devonp'rt	Devonport	1888	* 37,800	..	..	6 4-in., 4 M.	..	13·25	105	76
3rd cl. Cr.	**Philomel**	S.	2575	265	0	41	0	15	6	2	7500	Devonp'rt	Earle	1890	156,102							
" "	**Phœbe**	S.	2575	265	0	41	0	15	6	2	7500	Devonp'rt	Devonport	1890	161,154	2	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	2	19·0	300	217
Sloop	**Phœnix**	S. shd.	1050	185	0	32	6	11	3	2	1400	Devonp'rt	Devonport	1895	63,930	·22	..	6 4-in. Q.F., 4 3-pr., 3 M.	..	13·0	160	106
1st cl. G. B.	**Pigeon**	C.	755	165	0	30	0	11	4	1	1200	Pembroke	Barrow	1888	* 37,800							
" "	**Pigmy**	C.	755	165	0	30	0	11	4	1	1200	Sheerness	Barrow	1888	37,700	..	..	6 4-in., 4 M.	..	13·25	105	76
" "	**Plover**	C.	755	165	0	30	0	11	4	1	1200	Pembroke	Barrow	1888	37,700							
2nd cl. Cr.	**Pique**	S. shd.	3600	300	0	43	8	17	6	2	9000	Jarrow	Palmer	1890	184,108	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	273
T. Ram	**Polyphemus**	S.	2640	240	0	40	0	20	0	2	5500	Chatham	Humphrys	1881	174,450	..	3–2	6 6-pr. Q.F., 2 M.	5	18·0	300	..

* Includes Gun Mountings, &c.

‡ Details not yet complete.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Norm al Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
3rd cl. Cr.	**Porpoise**	S.	1770	225 0	36 0	14 6	2	3500	Glasgow	Thomson	1886	87,583	..	..	6 6-in. Q.F., 8 3-pr., 2 M., 1 l.	3	16·5	475	172
1st cl. Cr.	**Powerful**	S. shd.	14,200	500 0	71 0	29 0	2	25,000 B	Barrow	Barrow	1895	674,879	6	3–6	2 9·2-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 9 M., 2 12-pr. boat	4	22·1	1500*	840
3rd cl. Cr.	**Pylades**	C.	1420	200 0	38 0	15 9	1	1400	Sheerness	Laird	1884	62,000	..	1¼	14 5-in., 8 M., 1 l.	..	12·6	400	170
3rd cl. Cr.	**Racoon**	S.	1770	225 0	36 0	13 6	2	4500	Devonp'rt	Harland	1887	*x* 91,606	..	..	6 6-in. Q.F., 8 3-pr., 2 M., 1 l.	3	17·5	475	176
2nd cl. Cr.	**Rainbow**	S. shd.	3600	300 0	43 8	17 6	2	9681	Jarrow	Palmer	1891	184,086	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·7	400	273
2nd cl. G. Ves. (Surveying Service.)	**Rambler**	C.	835	157 0	29 6	13 7	1	650	Glasgow (Fairfield)	Elder	1880	37,038	..	..	2 20-pr., 1 M., 1 l.	..	10·66	40	160
1st cl. G. B.	**Rattler**	C.	715	165 0	29 0	11 0	1	1200	Elswick	Hawthorn	1886	*x* 38,734	..	..	6 4-in., 4 M.	..	13·6	105	76
T. G. B.	**Rattlesnake**	S.	550	200 0	23 0	8 0	2	2700	Birkenh'd	Laird	1886	*x* 35,425	..	..	1 4-in., 6 3-pr. Q.F.	4	18·5	100	67

2nd cl. G. B.	Raven	C.	465	125	0 28	6 10	0	1	360	Poplar	Rennie	1882	21,050	..	..	2 64-pr. M.L.R., 2 20-pr., 2 M.	..	9·5	40	62
1st cl. G. B	Redbreast	C.	805	165	0 31	0 11	7½	1	1200	Pembroke	Earle	1888	38,700	..	..	6 4-in., 4 M.	..	13·0	105	76
„ „	Redpole																			
2nd cl. G. B.	Redwing	C.	461	125	0 23	6 10	0	1	360	Pembroke	Maudslay	1880	22,200	..	..	2 20-cwt., 2 M.	..	9·68	40	..
T. G. B.	Renard	S.	810	230	0 27	0 8	9	2	3500	Birkenh'd	Laird	1892	53,848	2	..	2 4·7 in. Q.F., 4 3-pr.	3	19·25	100	91
2nd cl. Cr.	Retribution	S. shd.	3600	300	0 43	8 17	6	2	9000	Jarrow	Palmer	1891	183,975	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	275
Sloop	Rinaldo	S.	980	180	0 33	0 11	6	2	1400 B	Laird	Laird	Bldg.	63,180	..	..	6 4-in. Q.F., 4 3-pr.	..	13.25	130	130
3rd cl. Cr.	Ringarooma (Australia)	S.	2575	265	0 41	0 15	6	2	7500	Glasgow	Thomson	1890	128,076	2	2–1	8 4·7-in. Q.F., 8 3-pr. Q.F., 4 M., 1 l.	4	19·0	300	216
1st cl. G. B.	Ringdove	C.	805	165	0 31	5 11	7½	1	1200	Devonp'rt	Devonport	1889	39,753	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
1st cl. Cr.	Royal Arthur	S. shd.	7700	360	0 60	0 27	9	2	12,000	Portsm'th	Maudslay	1891	402,414	6	5–1	1 9·2-in., 12 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	19·7	850	567
Sloop	Rosario	S. shd.	980	180	0 33	0 11	6	2	1400 B	Sheerness	Governm't	1898	77,962	..	..	6 4-in., 4 3-pr. Q.F.	..	13·25	130	130
3rd cl. Cr.	Royalist	C.	1420	200	0 38	0 15	9	1	1400	Devonp'rt	Maudslay	1883	68,173	..	1½	2 6-in., 10 5-in., 4 M., 1 l.	..	12·6	400	171
1st cl. Cr.	St. George	S. shd.	7700	360	0 60	8 23	9	2	12,000	Hull	Maudslay	1892	377,204	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	19·7	850	559
T. G. B.	Salamander	S.	735	230	0 27	0 8	3	2	3500 M.	Chatham	Maudslay	1889	57,911	2	..	2 4·7-in. Q.F., 4 3-pr. Q.F.	3	20·0	100	91
„ „	Sandfly	S.	525	200	0 23	0 8	9	2	2700	Devonp'rt	Maudslay	1887	x 36,167	·22	..	1 4-in., 6 3-pr. Q.F.	4	19·0	80	67

* Includes Gun Mountings, &c.

* Bunker capacity, 3000.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft in.	ft. in.	no.					£	in.	in.			knots.	tons.	
2nd cl. Cr.	Sappho	S.	3400	300 0	43 0	16 6	2	9861	Poplar	Penn	1891	171,853	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·47	400	273
” ”	Scout	S.	1580	220 0	34 0	14 6	2	3200	Glasgow	Thomson	1885	x 87,516	..	..	4 4·7-in. Q.F., 8 3-pr., 2 M., 1 l.	3	16·7	450	147
2nd cl. Cr.	Scylla	S.	3400	300 0	43 0	16 6	2	9280	Poplar	Penn	1892	171,593	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	(1 sub.) 4	20·62	400	273
T. G. B.	Seagull	S.	735	230 0	27 0	8 3	2	3500 Nic.	Chatham	Maudslay	1889	56,922							
” ”	Sharpshooter	S.	735	230 0	27 0	8 3	2	3500 B	Devonp'rt	Bellis	1888	x 50,029	2	..	2 4·7-in., 4 3-pr. Q.F.	3	20·0	100	91
Sloop	Shearwater	S. shd.	980	180 0	33 0	11 6	2	1400 B	Sheerness	Thames Co.	Bldg.	65,400	..	..	6 4-in., 4 3-pr. Q.F.	..	13·25	130	130
T. G. B.	Sheldrake	S.	735	230 0	27 0	8 3	2	3500 B & W	Chatham	Maudslay	1889	57,800	2	..	2 4·7-in., 4 3-pr. Q.F.	3	20·0	100	91
” ”	Skipjack	S.	735	230 0	27 0	8 3	2	3500 R	Chatham	Laird	1889	59,531							
” ”	Spanker*	S.	735	230 0	27 0	8 3	2	3920 Du T.	Devonp'rt	Bellis	1889	50,000	2	..	2 4·7-in., 4 3-pr. Q.F.	3	20·0	100	91
” ”	Speedwell	S.	735	230 0	27 0	8 3	2	3500	Devonp'rt	Laird	1889	52,000							
1st cl. Cr.	Spartiate	S. shd.	11,000	435 0	69 0	26 0	2	18,000 B	Pembroke	Maudslay	1898	569,841	4½–2	4–2½	16 6-in., 17 small Q.F., 2 12-pr. boat.	3 (2 sub.)	20·75	1000	600
2nd cl. Cr.	Severn	S.	4050	300 0	46 0	19 6	2	6000	Chatham	Humphrys	1885	x 212,621	4	3–2	2 8-in., 10 6-in. Q.F., 3 6-pr., 2 3-pr., 10 M., 2 l.	..	17·3	900	327

2nd cl. Cr.	Sirius	S. shd.	3600	300	0	43	8	17	6	2	9000	Elswick	Maudslay	1890	186,649	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	..
„ „	Spartan	S. shd.	3600	300	0	43	8	17	6	2	9000	Elswick	Maudslay	1891	186,351							
1st cl. G. B.	Sparrow	C.	805	165	0	31	0	11	7½	1	1200	Greenock	Greenock	1889	39,000	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
T. G. B.	Speedy	S.	810	230	0	27	0	8	9	2	4703 T	Chiswick	Thornycrft	1893	58,927	2	..	2 4·7-in. Q.F., 4 3-pr.	3	20·21	100	91
„ „	Spider	S.	525	200	0	23	0	8	9	2	2700	Devonp'rt	Maudslay	1887	x 36,300	·22	..	1 4-in., 6 3-pr. Q.F.	4	19·0	80	67
2nd cl. G. B.	Starling	C.	465	125	0	23	6	10	0	1	360	Poplar	Rennie	1882	21,100	..	..	2 64-pr. M.L.R., 2 20-pr., 2 M.	..	9·5	40	61
„ „	Stork	C.	465	125	0	23	6	10	0	1	360	Poplar	Rennie	1882	21,150	..	..	1 M., 2 l.	..	9·5	40	..
D. V.	Surprise	S.	1650	250	0	32	6	14	0	2	3000	Jarrow	Palmer	1885	x78,764	..	..	4 5-in., 4 6-pr. Q.F., 2 M.	..	17·0	400	114
Sloop	Swallow	C.	1130	195	0	28	0	11	6	2	1500	Sheerness	Rennie	1885	59,797	..	..	8 5-in., 8 M.	..	13·5	280	135
2nd cl. G. V.	Swift	C.	756	165	0	29	0	10	11	2	870	Blackwall	Rennie	1879	34,670	..	..	2 90-cwt. M.L.R., 4 6-pr. Q.F., 2 M.	..	11·81	180	92
2nd cl. Cr.	Talbot	S. shd.	5600	350	0	53	6	21	0	2	9600	Devonp'rt	Devonport	1895	273,856	3	1½–3	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 1 3-pr., 4 M., 1 l.	3 (2 sub.)	20·0	550	433
3rd cl. Cr.	Tartar	S.	1770	225	0	36	0	14	3½	2	3500	Glasgow	Thomson	1886	x 87,583	..	..	6 6-in. Q.F., 8 3-pr., 2 M., 1 l.	3	16·5	325	177
„ „	Tauranga (Australia)	S.	2575	265	0	41	0	15	6	2	7500	Glasgow	Thomson	1889	128,101	2	2–1	8 4·7-in. Q.F., 8 3-pr. Q.F., 4 M., 1 l.	4	19·0	300	212
2nd cl. Cr.	Terpsichore	S.	3400	300	0	43	0	16	6	2	9000	Glasgow	Thomson	1890	173,341	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 9 M., 1 l.	4	20·0	400	275
1st cl. Cr.	Terrible	S. shd.	14,200	500	0	71	0	27	0	2	25,000 B	Glasgow	Thomson	1895	681,419	6	3–6	2 9·2-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 9 M., 2 12-pr. boat.	4	22·4	3000	810
2nd cl. Cr.	Thames	S.	4050	300	0	46	0	19	6	2	5700	Pembroke	Penn	1885	205,452	4	3–2	2 8-in., 10 6-in. Q.F., 3 6-pr., 8 3-pr., 6 M., 2 l.	2	16·8	900	326
1st cl. G. B.	Thistle	S.	700	180	0	33	0	8	0	2	1300 Y	Glasgow	London and Glasgow Co.	Bldg.	51,105	..	..	2 4-in. Q.F., 4 12-pr.	..	13·5	50	85
1st cl. Cr.	Theseus	S.	7350	360	0	60	0	23	9	2	12,000	Blackwall	Maudslay	1892	347,577	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·0	850	544
2nd cl. Cr.	Thetis	S.	3400	300	0	43	0	16	6	2	9000	Glasgow	Thomson	1890	173,146	2	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	2
„ „	Tribune	S.	3400	300	0	43	0	16	6	2	9000	Glasgow	Thomson	1891	173,006							

x Includes Gun Mountings, &c.

X

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
1st cl. G. B	Thrush	C.	805	165 0	31 0	11 7½	1	1200	Greenock	Greenock F'ndry Co.	1889	39,000	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
Sloop	Torch	S. shd.	960	180 0	32 6	11 6	1	1400	Sheerness	Sheerness	1894	60,564	..	..	6 4-in. Q.F., 4 3-pr., 2 M.	..	13·25	130	..
2nd cl. Cr.	Venus*	S. shd.	5600	350 0	54 0	21 2	2	9600	Fairfield	Fairfield	1895	249,938	3	2½	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 7 3-pr., 4 M., 1 12-pr. boat	3 (2 sub.)	19·5	550	470
Sloop	Vestal	S. shd.	980	180 0	33 0	11 6	2	1400 B	Sheerness	Governm't	Bldg.	94,301	..	..	6 4-in., 4 3-pr. Q.F.	..	13·25	130	130
2nd cl. Cr.	Vindictive	S.	5800	320 0	54 0	20 6	2	10,000 B	Chatham	Chatham	1896	290,458	3	1–2 N.S.	4 6-in. Q.F., 6 4·7-in., 9 12-pr., 3 3-pr., 1 12-pr. boat, 5 M.	2	19·5	500	450
T. D. S.	Vulcan	S.	6620	350 0	58 0	23 0	2	12,032	Portsm'th	Humphrys	1889	370,447	2	5–2½	8 4·7-in. Q.F., 12 3-pr., 16 M., 1 l.	6 (2 sub.)	20·0	1000	433
3rd cl. Cr.	Wallaroo (Australia)	S.	2575	265 0	41 0	15 6	2	7500	Elswick	Hawthorn	1889	115,995	2	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	4	19·0	300	218
1st cl. G. B.	Widgeon	C.	805	165 0	30 0	11 7½	1	1200	Pembroke	Rennie	1889	39,315	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76

* Venus: trial, 20·1 knots.

River Gunboats.—Herald, Mosquito (1890), 82 tons; Jackdaw, Heron, Robin, Nightingale, Snipe (1897), 85 tons; Woodcock, Woodlark (1897), 122 tons, 2 6-prs., 4 Maxims; 4 recent boats in the Niger Protectorate. Recent Egyptian boats: Melik, Sultan, Sheik, 140 tons, 4 12-prs., 4 Maxims.

Royal Naval Reserved Merchant Cruisers.

—	Name.	Owners	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an Annual subvention and permitted to fly the blue ensign.	Campania	Cunard Company	610	65	26	12,950	30,000	21
	Lucania	" "	610	65	26	12,950	30,000	21
	Himalaya	Peninsular and Oriental Co.	465½	52	22½	6,898	10,000	17
	Australia	" " "	465½	52	22½	6,901	10,000	17
	Victoria	" " "	466	52	22½	6,091	7,000	16
	Arcadia	" " "	466	52	22½	6,188	7,000	16
	Majestic . . . 2 s.	White Star Company	565	58	24½	9,965	16,000	20
	Teutonic . . . 2 s.	" "	565	58	24½	9,984	16,000	20
	Empress of India . 2 s.	Canadian Pacific Railway Co.	440	51	24½	5,905	10,000	16
	Empress of China . 2 s.	" " "	440	51	24½	5,905	10,000	16
	Empress of Japan . 2 s.	" " "	440	51	24½	5,905	10,000	16
Ships held at the disposition of the Admiralty without subsidy.	Etruria	Cunard Company	501½	57	26	8,120	14,500	19½
	Umbria	" "	501½	57	26	8,128	14,500	19½
	Servia	" "	515	52	26	7,392	10,000	16½
	Aurania	" "	470	57	27	7,269	9,500	17
	Britannic	White Star Company	455	45	25	5,004	5,200	16
	Germanic	" "	455	45	25	5,008	5,200	16
	Cymric	" "	..	..	..	12,551	6,700	..
	Britannia	Peninsular and Oriental Co.	466	52	22½	6,525	7,000	16
	Oceana	" " "	466	52	22½	6,188	6,000	16
	Peninsular	" " "	410½	48	..	5,287	4,972	15
	Oriental	" " "	410½	48	..	5,284	4,972	15
	Valetta	" " "	420½	45	22½	4,904	5,000	15
	Massilia	" " "	420½	45	22½	4,902	5,000	15
	Rome	" " "	430	44½	22½	5,545	5,500	15
	Carthage	" " "	430	44½	22½	4,879	5,000	15
	Ballarat	" " "	420	43	22½	4,778	4,500	14
	Parramatta	" " "	420	43	22½	4,756	4,500	14

There are also numerous ships on the Admiralty List complying with Admiralty conditions as to subdivision which have no national tie. They are suitable for receiving an armament, but there is no arrangement with Owners, except the promise of preference for occasional State employment.

GREAT BRITAIN, COLONIES, &c.—Cruising Ships, Gunboats, &c.

To what Government belonging.	Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Stowage.	Armament.
							ft. in.	ft. in.	ft. in.				tons.	
INDIA	T. G.B. .	Assaye .	Steel	2	Elswick	1891	230 0	27 0	8 3	735	3,500	19·0	100	2 4·7-in. Q.F., 4 3-pr. do., 1 f. tu. & 3 l. car.
INDIA	D. V. . .	Lawrence .	Steel	Pad.	B'kenh'd	1886	212 2	32 2	18 3	1,154	1,277	13·5	270	Four 4-in. B.L.R., 4 6-pr. Q.F., 4 M.
INDIA	T. G. B. .	Plassy .	Steel	2	Elswick	1890	230 0	27 0	8 3	735	3,500	19·0	100	2 4·7-in. Q.F., 4 3-pr. do., 1 f. tu. & 3 l. car.
QUE'NS-LAND.	Gun-vessel	Gayundah	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	400	10·0	..	One 8-in. 11½-ton; one 6-in. 4-ton; one 3-pr. Q.F.; 2 M.
QUE'NS-LAND.	Gun-vessel	Paluma .	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	340	10·0	..	One 8-in. 11½-ton; one 6-in. 4-ton; one 3-pr. Q.F.; 2 M.
SOUTH AUS-TRALIA	Cruiser .	Protector .	Steel	2	..	1884	188 0	3 0	12 6	920	1,640	14·0	..	One 8-in. 11½-ton; five 6-in. 4-ton; five Gatlings.

The five second-class Cruisers, and the two Torpedo-Gunboats of the Australian Auxiliary Squadron, are included in the list of Ships of the Royal Navy, as well as the armour-clads Abyssinia, Cerberus, and Magdala.

ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Battery or Turret.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.					£	inches.	inches.	inches.			knots.	tons.	
c.b.	Almirante Brown	S.	4267	240 0	50 0	20 6	2	4500	Poplar	1880	190,000	9 (cp.)	8 (cp.)	1½	10 5·9-in. Q.F. (Canet), 4 4·7 in., 8 2·4 in., 2 M.	2	13·75	650	350
c.d.s.t.	Andes	I.	1558	186 0	44 0	9 6	2	750	Birkenhead	1875	85,600								
c.d.s.t.	Plata	I.	1558	186 0	44 0	9 6	2	750	Birkenhead	1874	85,600	6	9	1	2 11-in., 2 4·7-in., 4 M.	..	9·5	120	120
a.c.	Garibaldi	S.	6840	328 0	59 8	24 0	2	13,384	Sestri Ponente	1895	681,240	6 H.S.	6 H.S.	1½	2 10-in., 10 6-in. Q.F., 6 4·7 in., 10 2·2 in., 10 1·4 in., 2 M.*	..	19·9 (*t*)	1000†	500
a.c	General Belgrano	S.	7182	328 0	59 8	24 0	2	13,000	Leghorn	1897	—	6 H.S.	6 H.S.	1½	2 10-in., 14 6-in. Q.F., 2 3-in., 10 2·2-in., 8 1·4-in., 2 L., 2 M.	4 sub.	20·1	1000	500
c.d.s.b.	Independencia	S.	2336	230 0	44 4	13 0	2	3000	Birkenhead	1891	176,600								
c.d.s.b.	Libertad	S.	2336	230 0	44 4	13 0	2	3000	Birkenhead	1890	176,600	8 (cp.)	8 (cp.)	2	2 9·4-in., 4 4·7-in. Q.F., 4 3-pr., 4 M.	2	14·4	340	225
a.c.	Pueyrredon	S.	6882	328 0	59 8	24 0	2	13,000 B	Sestri Ponente	1898	—	6 H.S.	6 H.S.	1½	2 10-in., 10 6-in. Q.F., 6 4·7 in., 10 2·2-in., 10 1·4-in., 2 M.	4 sub.	20·1	1000	500
a.c.	San Martin	S.	6882	328 0	59 8	24 0	2	13,000	Leghorn	1896	664,600	6 H.S.	6 H.S.	1½	4 8-in., 10 6-in. Q.F., 6 4·7, 12 2·2, & 10 1·4 in., 2 L., 2 M.*	4 sub.	19	1100	500

* Armament of Garibaldi, San Martin, General Belgrano and Pueyrredon, and Q.F. guns of Libertad and Independencia are Armstrong.

† Bunker capacity.

ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.			knots.	tons.	
g.v.	Argentina	S.	820	192 0	27 0	13 0	1	850	Trieste	1883	25,500	..	..	1 6-in., 6 7-c.m. Krupp, 4 M.	..	12·0	220	120
cr.	Buenos Aires	S. shd.	4780	396 0	47 2	19 0	2	17,000	Elswick	1895	383,000	4½	1–5	2 8-in. Q.F. (Armstrong), 4 6-in. Q.F., 6 4·7-in. Q.F., 16 3-pr., 6 1-pr.	5	23·2*	1000†	429
to.g.b.	Espora	S.	520	210 0	25 0	8 0	2	3500	Birkenhead	1890	..	..	..	3 3-in. Q.F., 4 3-pr., 2 M.	5	20·0	100	124
cr.	Nueve de Julio	S.	3570	354 0	44 0	19 6	2	14,350	Elswick	1892	293,000	4½	4½	4 6-in. Q.F. (Armstrong), 8 4·7-in., 12 3-pr., 12 1-pr.	5	22·74	770†	300
cr.	Patagonia	S. & W.	1442	220 0	32 10	12 9	2	2400	Trieste	1885	100,000	..	1½	1 10-in., 3 6-in., 6 1., 10 M.	..	13·0	350	210
to.g.b.	Patria	S.	1070	250 0	31 0	10 0	2	4500	Birkenhead	1893	87,000	..	..	2 4·7-in. Q.F., 4 8-pr., 2 3-pr., 2 M.	5	20·75	288	159
g.v.	Paraná	I.	550	142 8	25 0	11 9	1	475	Birkenhead	1874	..	..	..	2 6-in., 2 4·7-in.	..	11·0	..	..
cr.	25 de Mayo	S.	3200	325 0	43 0	16 0	2	13,800	Elswick	1890	260,000	4½	4½	2 8·2-in. (Armstrong) 8 4·7-in. Q.F., 12 3-pr., 12 1-pr.	6	22·43	600†	185
g.v.	Uruguay	I.	550	142 8	25 0	11 9	1	475	Birkenhead	1874	..	..	..	2 6-in., 2 4·7-in.	..	11·0	..	..

Messrs. Laird have built a training-ship (cruiser), Presidente Sarmiento, 2750 tons, 2000 I.H.P. (Niclausse boilers), and 13 knots speed, with nineteen guns and three torpedo-tubes; launched 1897. There are several other small gunboats; also the torpedo-ram Maipù (1063 tons, 1750 I.H.P.), built in England in 1880. The Florio Company has sold to the Argentine Government the steamships Arno, Regina Margherita, and Sempione to be converted into cruisers; and the Spanish firm of Pinillos, Salny & Co.; the Barcelona (4020 tons register), and Cadiz (4218 tons), which have been re-named Pampa and Gaucho.

* Natural draught. † Bunker capacity.

AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
															Belt.	Gun Position.	Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.					£	inches.	inches.	inches.			knots.	tons.	
b.	"A." (Ersatz Laudon)	S.	10000	..		..		..		..	Y 14,000	..	Pro.	..	..	..	..	..	..	..	..	..
c.d.s.	Budapest . .	S.	5550	305	0	55	9	21	0	2	9185 B	Trieste .	1896	349,600	10·6 H.S.	10·6 H.S.	2½ H.S.	4 9·4-in., 6 5·9-in. Q.F., 14 47-m.m. Q.F., 2 M.	4	17·8 (t)	500	..
c.b.	Custoza . . .	I.	7060	302	3	58	0	24	6		4440	Trieste .	1872	414,400	9	7	1½	8 10·2-in. (Krupp), 11 Q.F., 8 l.	2	14·0	584	567
c.b.	Don Juan de Austria	I.	3550	240	3	50	0	20	0	1	2700	Trieste .	1875	..	8	6	1	8 8·2-in. (Krupp), 11 Q.F. & M., 6 l.	4	13·0	380	440
a. c.	"E." (Ersatz Radetzky)	S.	7400	383	10	61	8	21	4	2	13,000 Y	..	Bldg.	..	..	..	..	2 9·4-in., 10 5·9-in. Q.F., 27 smaller	..	21·0	..	..
c.d.s.	Erzherzog Albrecht.	I.	5940	285	2	56	3	22	0	1	3600	Trieste.	1872	357,600	9	7	1½	8 9 4-in. (Krupp), 11 Q.F., 8 l.	2	13·0	453	535
b.	Habsburg	S.	8340	354	3	65	8	23	4	2	11,000 B	Trieste.	1900	..	8·6 H.S.	8·2 H.S.	2½ H.S.	3 9·4-in., 12 5·9-in. Q.F., 24 smaller.	..	18·0	840	..
a.c.	Kaiserin Maria Theresia	S.	5270	351	0	52	6	21	4	2	9755	Trieste .	1893	304,187	4	4	2	2 9·4-in., 8 5·9-in. Q.F., 18 1·8 Q.F., 2 2·7-in., 2 M.	4	19·0	740	450
a.c.	Kaiser Karl VI. .	S.	6250	367	6	56	0	20	4		12,800 B	Trieste .	1898	368,124	10·6 H.S.	9·8 H.S.	1½ H.S.	2 9·4-in., 8 5·9-in. Q.F., 18 1·8, 2 M.	4	20·0	800	450
c.b.	Kaiser Max . .	I.	3566	240	3	50	0	20	0	1	2700	Trieste .	1875	211,600	8	6	1	8 8·2-in. (Krupp), 11 Q.F. & M., 6 l.	4	13·0	380	440
Riv. Mon.	Körös . . .	S.	448	177	0	29	6	4	0	2	1250	Buda Pesth	1892	..	2	3	¾	2 4·7-in. Q.F., 2 l., 1 M. .		10·0	..	..
b.	Kronprinz Rudolph	S.	6940	295	0	62	4	25	3	2	7500	Pola . .	1887	330,000	12	10	2½	3 12-in. (Krupp), 6 4·7-in. Q.F., 11 smaller & M., 2 l.	4	16·0	600	492
b.	Kronprinzessin Stephanie	S.	5150	278	10	55	9	21	6	2	8300	Trieste .	1887	300,000	9	8	1	2 12-in. (Krupp), 6 5·9-in., 11 Q.F. & M., 2 l.	4	17·0	400	510
Riv. Mon. ”	Leitha . . Maros . .	I. & S.	310	166	0	27	6	3	7	2	320	Buda Pesth	1871	20,000	1·7	2	1	1 4 7-in. Q.F., 2 M. . .	..	8·0	20	54
c.d.s.	Monarch . .	S.	5550	305	0	55	9	21	0	2	8900	Pola . .	1895	339,062	10·6 H.S.	10·6 H.S.	2½ H.S.	4 9·4-in., 6 5·9-in. Q.F., 14 47-m.m. Q.F., 2 M.	4	17·4 (t)	500	..
c.b.	Prinz Eugen . .	I.	3566	240	6	50	0	20	0	1	2700	Pola . .	1877	..	8	6	1	8 8·2-in (Krupp), 11 Q.F. & M., 6 l.	4	13·0	380	440
Riv. Mon.	Szamos . . .	S.	448	177	0	29	6	4	0	2	1250	Buda Pesth	1892	..	2	3	¾	2 4·7-in. Q.F., 2 Q.F., 1 M. .	..	10·0		
c.b.	Tegetthoff . .	I. & S.	7390	286	11	71	1	24	10	2	8800	Trieste .	1878 1893	..	14	14	3	6 9·4-in. (Krupp), 5 5·9-in. Q.F., 15 smaller do., 2 M.	4	16·3	670	578
c.d.s.	Wien . . .	S.	5550	305	0	55	9	21	0	2	8480	Trieste .	1895	337,850	10·6 H.S.	10·6 H.S.	2½ H.S.	4 9·4-in., 6 5·9 Q.F., 14 47-m.m. Q.F., 2 M.	4	17·6 (t)	500	..
c.d.s.b.	Unnamed II. III. .	S.	8300	354	3	65	8	23	4	2	11,000 B.	Trieste .	Bldg.	480,000	8·6 H.S.	8·2 H.S.	2½ H.S.	3 9·4-in., 12 5·9-in. Q.F., 24 smaller.	..	18·0	840	..
c.d.s.b.	Unnamed IV. . .	S.	8300	354	3	65	8	23	4	2	11,000 B.	Trieste .	Pro.	480,000	8·6 H.S.	8·2 H.S.	2½ H.S.	3 9·4-in., 12 5·9-in. Q.F., 24 smaller.	..	18·0	840	..

AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			n.et.tns.	ft.	in.	ft.	in.	ft.	in.					£	in.	in.			knots.	tons.	
corv.	**Aurora**	C.	1370	190	6	32	10	16	1	1	1000	Trieste	1873	..	..	..	2 4·7-in. (Wahrendorf), 5 l., 2 M. or Q.F.	..	11·0	160	200
to. cr.	**Aspern ("B.")**	S.	2400	301	10	39	6	14	2	2	7300 Y	Pola	1899	155,000	..	..	8 4·7-in. Q.F., 12 1·8 in.	1	20·0	..	..
to. g. b.	**Blitz**	S.	360	193	6	22	4	8	0	1	3500	Elbing	1888	..	..	..	9 Q.F.	..	21·0	250	61
cr. 3rd cl.	**Donau**	C.	2344	230	0	42	8	19	8	1	1800	Pola	1893	..	..	..	10 4·7-in. (Uchatius), 4 M., 1 l.	..	12·0	320	..
cr. 3rd cl.	**Erzherzog Friedrich**	W.	1590	173	10	39	5	16	9	1	800	Venice	1874	..	..	..	10 5·9-in. (Wahrendorf), 1 l.	..	9·0	200	261
cr.	**Frundsberg**	C.	1370	190	6	32	10	16	1	1	1000	Trieste	1873	..	..	..	2 5·9.in. (Wahrendorf), 5 l., 2 M. or Q.F.	..	11·0	160	209
cr. 2nd cl.	**Kaiserin Elizabeth**	S.	4064	321	6	47	6	18	7	2	9000	Pola	1890	..	3·5	2¼	2 9·4-in. (Krupp), 6 5·9-in. do., 11 Q.F., 2 l.	5	19·0	660	450
cr. 2nd cl.	**Kaiser Franz Joseph I.**	S.	4030	321	6	47	6	18	7	2	9000	Trieste	1889	..	3·5	2¼	2 9·4-in. (Krupp), 6 5·9-in. do., 11 Q.F., 2 l.	5	19·0	660	450
to. g. b.	**Komet**	S.	360	193	6	22	4	8	0	..	3500	Elbing	1888	..	..	..	9 Q.F.	..	21·0	..	61
cr. 2nd cl.	**Laudon**	C.	3430	253	0	46	0	20	8	1	2600	Trieste	1873	..	..	..	15 5·9-in. (Krupp), 7 Q.F. & M., 2 l.	..	13·0	450	497
cr. 3rd cl.	**Leopard**	S.	1582	224	0	34	0	14	0	2	6000	Elswick	1886	200,000	..	..	2 4·7-in. Q.F., 10 Q.F. & M.	4	18·3	250	148
to. g. b.	**Lussin**	S.	1011	200	4	26	3	12	2	2	1830 Dürr.	Trieste	1883	..	..	1½	2 5·9-in. (Krupp), 7 M., 1 l.	..	14·0	200	142

to. g. b.	**Magnet**	S.	510	219	10	26	10	8	0	2	6000 T.	Elbing	1896	51,052	..	..	6 1-8-in. Q.F.	3	26·0*t*	105	..
to. g. b.	**Meteor**	S.	350	187	0	22	4	8	0	2	3500	Elbing	1887	..	..	..	9 Q.F.	1	23.1	120	61
cr. 3rd cl.	**Panther**	S.	1582	224	0	34	0	14	0	2	6000	Elswick	1885	..	..	..	2 4·7-in. Q.F., 10 Q.F. & M.	4	18·5	250	148
to. deps.	**Pelican**	S.	2470	279	0	39	4	15	6	..	4600	Elbing	1891	..	..	..	2 5·9-in. (Krupp), 8 Q.F.	4	18·0	..	..
to. g. b.	**Planet**	S.	500	210	0	23	0	8	3	2	3500	Jarrow	1889	..	..	..	10 Q.F.	1	19·6	..	61
cr. 3rd cl.	**Saida**	C.	2500	233	4	42	8	19	1	1	1800	Pola	1878	..	..	..	11 5·9-in. (Uchatius), 1 l.	..	12·0	320	299
to. g. b.	**Satellit**	S.	540	220	6	26	9	9	2	2	4000	Elbing	1893	..	..	1½	9 Q.F.	..	21·87	..	61
to. g. b.	**Sebenico**	S.	900	187	0	26	3	12	2	2	1380	Pola	1882	..	..	..	7 Q.F., 5 l.	..	14·0	200	142
cr. 3rd cl.	**Spalato**	S.	850	179	6	26	3	12	2	2	1200	Trieste	1879	..	..	..	7 Q.F., 5 l.	..	14·0	150	142
to. cr.	**Szigètvár**	S.	2350	301	10	39	6	14	2	2	7300 Y.	Pola	1899	155,000	..	..	8 4·7-in. Q.F., 12 1·8-in.	1	20·0	..	..
to. cr.	**Tiger**	S.	1684	233	0	32	10	15	5	2	5260	Trieste	1887	..	..	..	4 4·7-in., 10 Q.F.	..	18·0	300	190
to. g. b.	**Trabant**	S.	530	210	0	23	0	8	3	2	3500	Trieste	1890	..	..	..	10 Q.F.	1	20·0	..	61
to. v.	**Zara**	S.	850	179	6	26	3	12	2	2	1200	Pola	1879	..	..	..	7 Q.F., 5 l.	..	14·0	150	142
to. cr.	**Zenta**	S.	2250	312	0	39	6	14	2	2	7800 Y.	Trieste	1897	143,780	..	..	8 4·7 Q.F., 12 1·8-in., 2 M.	1	20·9*t*	..	..
corv.	**Zrinyi**	C.	1370	190	6	32	10	16	1	1	1000	Trieste	1871	..	..	..	2 5·9-in. (Wahrendorf), 5 l., 2 M. or Q.F.	..	11.0	160	209

Four screw gunboats, between 540 and 870 tons displacement and 250 and 950 indicated horse-power.

BRAZIL.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Backing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.	inches.			knots.	tons.	
t. River	Alagoãs	W.	340	120 0	28 0	4 10	2	180	Brazil	1886	..	4½	4½	14½	1 7-in. M.L.R. (Whitworth), 2 M.	..	7·0	..	43
c.d.s., t.	Bahia	I.	1000	178 0	35 0	8 6	2	1640	Birkenhead	1865	..	4½	5½	10⅝	2 7-in. M.L.R. (Whitworth), 2 M.	..	6·0	..	125
t. River	Maranhao	S.	470	137 0	34 7	6 5	2	700	Rio de Janeiro	1890	..	5 H.S.	..	..	2 4·7-in. Q.F., 1 2·5-in., 5 M.	..	12·0	..	..
c.d s., t.	Marshal Deodoro	S.	3162	267 6	48 0	13 2	2	3400 D'A.	La Seyne	1898	..	13¾ H.S.	7¾-8¾ H.S.	1½	2 9·4-in., 2 5·9-in. howitzers, 4 4·7-in. Q.F., 2 M., 4 6-pr. and 2 1-pr.	2 (sub.)	15·0	236	200
c.d.s., t.	Marshal Floriano									1899									
t. River	Pará	S.	470	137 0	34 7	6 5	2	700	Rio de Janeiro	1890	..	5 H.S.	..	..	2 4·7-in. Q.F., 1 2·5-in., 5 M.	..	12·0	..	..
t. River	Piauhy	W.	340	120 0	28 0	4 10	2	180	Brazil	1887	..	4½	4½	14½	1 7-in. M.L.R. (Whitworth)	..	7·0	..	43
t.	Riachuelo	S. shd.	5700	305 0	52 0	19 6	2	7300	Poplar	1883 1895	365,000*	11 comp.	11 & 10 comp.	10 2"	4 9·2-in. (Whitworth, altered by Armstrong), 6 4·7-in., Q.F., 2 3-pr., 15 M.	5	16·71	800	450
t. River	Rio Grande	W.	340	120 0	28 0	4 10	2	180	Brazil	1888	..	4½	4½	14½	1 7-in. M.L.R. (Whitworth)	..	7·0	..	43
t.	24 de Maio (ex Aquidaban)	S shd.	4950	280 0	52 0	18 0	2	6200	Poplar	1885 1897	345,000*	11	11½ & 10 cp.	10 2"	4 9·4-in. (Canet), 4 5·5-in., 2 Q.F., 13 M.	5	15·0	600	350

* Exclusive of guns and ammunition. The ship is undergoing reconstruction at Elswick.

Floating batteries, Brazil (1518 tons) and Lima-Barros (1444 tons).

BRAZIL.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.†	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.			knots.	tons.	
cr.	**Almirante Tamandare**	S. shd.	4735	294 0	46 0	18 4	2	7500	Brazil	1890	..	..	1½	10 6-in. Q.F., 2 4·7-in., 8 M.	8	17·0	750	450
„	**Andrada** (ex America)	S. shd.	2600	252 8	34 0	18 0	1	3600	Bergen	1890	..	..	..	2 4·7-in. 2 14-pr. Q.F., 6 6-pr., 6 1-pr.	5	17·0	..	..
„	**Barroso**	S. shd.	3600	330 0	43 9	16 10	2	7500	Elswick	1896	..	4½	3	6 6-in. Q.F., 4 4·7-in., 10 6-pr., 4 1-pr., 4 M.	3	20·0	700	..
„	**Benjamin Constant**	S. shd.	2750	236 0	46 0	18 0	1	2800	La Seyne	1892	..	..	2	4 6-in. Q.F., 8 4·7-in., 8 M., 4 l.	4	14·0	260	287
to.cr.	**Caramuru**	S.	1030	249 6	30 9	10 2	2	6000	Kiel	1896	..	..	½	2 3·9-in. Q.F., 6 2·2-in., 2 1·4-in.	3	22·5	..	..
to.g.b.	**Gustavo Sampaio**	S.W.	500	197 0	21 0	7 9	2	2500	Elswick	1893	..	..	..	2 20-pr. Q.F., 4 7-pr. Q.F.	3	18·0	150	95
cr.	**Parnahyba** (Torpedo training.)	C.	838	170 6	26 3	11 2	1	900	Havre	1878	..	..	..	5 4·7-in., 4 M.	..	10·0	..	..
„	**Paysandu** (ex Guanabára)	W.	1900	200 0	41 2	16 4	1	3000	Brazil	1877	..	..	..	9 70-pr. M.L.R. (Whitworth), 6 M., 2 l.	..	13·0	..	250
cr.	**Primeiro de Março**	C.	726	167 3	26 3	10 6	1	750	Brazil	1881	..	..	..	7 4·5-in. M.L.R. (Whitworth), 4 M.	..	9·0	..	..
„	**Quinze de Novembro** (ex Republica)	S.	1300	210 0	35 0	13 0	2	3300	Elswick	1892	..	..	2–1	6 4·7-in. Q.F., 4 6-pr., 6 M.	4	17·0	170	160
to.cr.	**Tamoyo**	S.	1080	269 0	28 10	9 10	2	6500	Kiel	1898	..	..	..	2 3·9-in. Q.F., 6 2·2-in., 2 1·4-in., 2 M.	3	23·0	293	110
„	**Timbira**	S.	1030	249 6	30 9	10 2	2	7000	Kiel	1896	..	..	½	2 3 9-in. Q.F., 6 2·2-in., 2 1·4-in., 2 M.	3	22·5	250	110
g.v.	**Tiradentes**	S. shd.	800	165 0	30 0	11 0	2	1200	Elswick	1892	..	..	..	4 4·7-in. Q.F., 3 6-pr., 4 M.	2	14·5	110	107
cr.	**Tonelero** (ex Trajano)	W.	1414	200 0	30 0	15 6	2	2400	Brazil	{1873 / 1895}	..	..	..	7 4·7-in. Q.F., 4 M.	..	13·0	..	..
„	**Trinidade** (ex Liberdade)	I.	250	101 8	21 8	10 10	2	280	Brazil	1884	..	..	..	2 l., 1 M.	..	10·0	..	..
to.cr.	**Tupy**	S.	1030	249 6	30 9	10 2	2	7000	Kiel	1896	..	..	½	2 3·9-in. Q.F., 6 2·2-in., 2 1·4-in., 2 M.	3	22·5	250	110

† All the Q.F. guns above 6-pr. in Brazilian Navy are Armstrong.

Ten screw gunboats, 200 tons to 400 tons, and eight paddle gunboats, 120 tons to 160 tons.

CHILI.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.	inches.			knots.	tons.	
c.b.	Almirante Cochrane	W.I. shd.	3500	210 0	45 9	19 8	2	2920	Hull	1874	.	9	8	3″	6 8-in. (Armstrong), 4 6-pr. Q.F., 4 3-pr., 7 M.	3	13·0	350	242
a.c.	Almirante O'Higgins	S. sl d.	8500	411 9	62 6	22 0	2	16,000 B	Elswick	1897	..	7	6	2	4 8-in. Q.F., 10 6-in., 4 4·7-in, 10 12-pr., 10 6-pr., 4 M.	3 (2sub.)	21·5 (t.)	1260	..
b.	Capitan Prat	S. shd.	6900	328 0	60 8	21 10	2	12,000	La Seyne	1890	391,000	12	10½ 4	3″	6 9·4-in. (Canet), 8 4·7-in. Q.F. (Canet), 6 2·2-in., 4 1·8-in., 10 1·4-in., 5 M.	4	18·3	775	485
a.c.	Esmeralda	S. shd.	7020	436 0	53 2	22 3	2	16,000	Elswick	1896	..	6 H.S.		2	2 8-in. Q.F., 16 6-in., 8 12-pr., 2 3-pr., 4 M.	3 (2sub.)	22·8 (t.)	1350	..

The Huascar, 1800 tons, launched at Birkenhead in 1865, is now a floating battery.

Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Maximum Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.			knots.	tons.	
to.g.b. / to.g.b.	Almirante Condell / Almirante Lynch	S.	750	240 0	27 6	10 6	2	4500 B	Birkenhead	1890	..	..	..	3 14-pr. Q.F., 4 3-pr., 2 M.	5	21·0	210	..
,,	Almirante Simpson	S.	812	240 0	27 6	10 6	2	4700 Nor.	Birkenhead	1896	..	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	21·0t	200	..
cr.	Blanco Encalada	S. shd.	4400	370 0	46 6	18 6	2	14,500	Elswick	1893	..	..	4–1¾	2 8-in., 10 6-in. Q.F., 12 3-pr., 10 1-pr.*	5	22·78	†900	..
,,	General Baquedano (Training)	S.	2330	240 0	45 9	18‡ 0	1	1500 B	Elswick	1898	..	..	..	4 4·7-in. Q.F., 2 12-pr., 2 6-pr., 2 M., 1 l.	1	13·7	200 / 300	302
gv.	Magellanes	C.	800	190 0	28 0	14 9	2	1230	London	1874	..	..	..	2 6-in., 1 7-in. M.L.R., 6 M., 2 l.	..	11·0	300	100
cr.	Ministro Zenteno	S. shd.	3600	330 3	43 9	16 10	2	6500	Elswick	1896	..	..	..	8 6-in. Q.F., 10 6-pr., 4 1-pr.*	3	20·0t	800	..
gv.	Pilcomayo	W.	790	171 0	27 4	..	1	180 (nom.)	Birkenhead	1874	..	..	..	2 70-pr. B.L.R. (Armstrong), 2 40-pr., 3 M.	..	9·0	125	125
cr. / ,,	Presidente Errázuriz / Presidente Pinto	S. shd.	2080	268 0	35 9	19 6	2	5400	La Seyne	1890	..	..	3½	4 6-in. Q.F. (Canet), 2 5-in., 4 2·2-in., 6 M.	3	19·0	200	171

Two Gunboats of 145 tons displacement and one of 180 tons. * Armstrong. † Bunker capacity. ‡ Mean draught.

CHINA.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches			knots.	tons.	
cr.	Foo-Ching	S.	2500	253 0	36 2	18 0	2	2400	..	1893	..	$4\frac{1}{2}$	4–2	3 5-in. Krupp, 4 M., 2 l.	..	16·0	..	..
to.g.b.	Fei-Ying	S.	850	257 2	28 6	12 6	2	4500 Y	Stettin.	1895	..	2	..	2 4-in. Q.F., 6 3·4-in., 4 smaller.	3	21·8	75	90
cr.	Hai-Chi.	S.	4300	396 0	46 8	18 6	2	17000	Elswick.	1898	..	6	5	2 8-in. Q.F., 10 4·7-in., 12 3-pd., 4 1·4-in., 6 M.	5	24·0	300	374
„	Hai-Shen									1898								
„	Hai-Shew	S.	2950	314 8	41 0	16 0	2	8000	Vulcan, Stettin.	1897	..	2	3	3 6-in. Krupp Q.F., 8 4-in., 6 1·4-in. Hotchkiss, 6 M.	3 (1sub.)	20·7 (t.)	220 (500)	244
„	Hai-Yung									1897								
„	Hai-Tien	S.	4300	396 0	46 8	18 6	2	17000	Walker.	1897	..	6	5	2 8-in. Q.F., 10 4·7-in., 12 3-pd.	5	24·1 (t.)	300	374
„	Hi-Ying	S.	2200	253 0	36 2	18 1	2	2400	..	1895	..	..	..	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	1	21·0	..	..
„	Huang-Tái	C.	2110	260 0	36 0	20 0	1	1600	..	1886	..	..	..	3 7-in. Krupp, 7 40-pr., 6 M.	2	15·0	360	300
„	Kai-Chih	C.	2110	260 0	36 0	20 0	1	1600	..	1882	..	..	..	2 8·2-in., 6 5·9-in., 6 M., 5 l.	..	14·5	360	300
„	Kien-Wei	C.	2110	260 0	36 0	20 0	1	1600	..	1899	..	..	..	2 8·2-in., 6 5·9-in., 6 M., 5 l.	..	14·5	360	300
„	King-Ching	C.	2100	250 0	36 0	20 0	1	2400	..	1886	..	..	..	3 7-in. Krupp, 7 40-pr., 6 M.	2	14·5	360	300
to.g.b.	Kwang-Ting	C.	1000	235 0	27 6	11 4	2	3400	..	1890	..	..	1	3 4·7-in. Q.F., 4 M., 2 l.	4	16·0	..	120
cr.	Nan-Schuin	S.	2200	253 0	36 2	18 1	2	2400	Kiel.	1884	..	..	..	2 8-in. Armstrong, 8 4·7-in. Q.F., 9 M.	1	14·5	600	250
„	Nan-Thin	S.	2200	253 0	36 2	18 1	1	2400	Kiel.	1883	..	..	.	2 8-in. Armstrong, 8 4·7-in. Q.F., 9 M.	1	15·0	600	250
„	Pao-Min	S.	1480	213 0	36 0	14 0	1	2400	..	1884	..	..	..	2 6-in. Armstrong, 6 5-in., 2 l.	..	9	300	200
g.b.	Tien-Sing	W.	200	105 0	20 4	7 0	2	340	..	1875	..	3	..	1 7-in. (Krupp)	..	10·0	..	..
cr.	Unnamed	C.	2110	260 0	36 0	20 0	1	1600	..	Bldg.	..	..	..	2 8·2-in., 6 5·9-in., 6 M., 5 l.	..	14·5	360	300

The displacement of German-built ships in metric tons.
Torpedo-gunboat Pei-Ting (349 tons), four gunboats of 411 tons, two of 300 tons, four of 215 tons (defence of Canton Roads), training vessel Tung-Chi, 1700 tons—all launched 1885–88.

DENMARK.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
c.d.s., t.	**Gorm** . . .	I.	2344	231	0	40	0	14	0	2	1670	Copenhagen	1870	104,000	7	8	..	2 10-in. (Armstrong) M.L.R., 3 3·4-in. (Krupp), 4 M.	..	12·25	115	158
t.	**Helgoland** . .	I.	5347	257	6	59	2	18	8	2	4000	Copenhagen	1878	275,000	12	10	4	1 12-in. (Krupp), 4 10·2-in., 5 4·7-in., 10 M.	4	12·0	230	350
c.d.s., t.	**Herluf Trolle** .	S.	3470	271	0	50	0	16	2	2	4200 T	Copenhagen	1899	..	7¾ H.S	6 H.S.	..	2 9·4-in., 4 5·9-in. Q.F., 10 2·2-in., 8 smaller.	3 (sub.)	16·0	..	..
b.	**Iver Hvitfeldt** .	S.	3260	242	0	49	6	18	0	2	5100	Copenhagen	1886	200,000	12	8	2	2 10·2-in. (Krupp), 4 4·7-in., 12 M.	4	15·6	250	298
c.d.s., t.	**Lindormen**. .	I.	2076	216	0	39	5	13	9	2	1560	Copenhagen	1868	93,000	5	5	..	2 9-in. (Armstrong) M.L.R., 3 3·4-in. (Krupp), 4 M.	..	12·0	120	140
c.b.	**Odin†** . . .	I.	3083	237	0	50	0	15	6	1	2260	Copenhagen	1872	147,000	8	8	..	4 10-in. (Armstrong) M.L.R., 4 3·4-in. (Krupp), 7 M.	..	12·4	180	236
t.	**Skjold** . .	S.	2150	226	6	38	0	13	5	2	2200 T	Copenhagen	1896	..	9	8-4½	2	1 9·4-in., 3 4·7-in. (Krupp), 4 1·8-in. Q.F., 1 M.	4	13·0	..	..
T. S.	**Tordenskjold †**	S.	2400	221	6	43	3	15	6	2	2600	Copenhagen	1880	138,900	..	8	4–2	1 14-in. (Krupp), 4 4·7-in., 8 M.	4	14·0	170	220
c.d.s., t.	Unnamed* . . . (Herluf Trolle type)	S.	5470	271	0	59	2	18	8	2	4200	Copenhagen	Bldg.	..	7¾ H.S.	6 H.S.	..	2 9·4-in., 4 5·9-in. Q.F., 10 2·2-in., 8 smaller.	3 (sub.)	16·0	..	..

Esbern Snare (torpedo school-ship), 530 tons, 2-in. belt.

* Estimates of 1900–1901. † To be reconstructed.

DENMARK.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
g. v.	Absalon	I.	527	150	0	26	0	10	2	1	500	Blackwall	1862	..	2½	2½	4 3·4-in. (Krupp), 4 M.	..	10·0	65	70
"	Falster	I.	356	111	0	28	10	7	6	2	510	Copenhagen	1873	33,000	..	..	1 10-in. (Armstrong) M.L.R., 2 3·4-in. (Krupp), 2 M.	..	9·8	20	35
cr.	Fyen	S. shd.	2596	226	6	45	6	18	1	1	2700	Copenhagen	1882	170,000	..	1½	18 5·9-in. (Krupp), 8 M.	2	13·0	290	407
3rd cl. cr.	Geiser	S.	1280	257	6	27	6	11	4	2	3000 T	Copenhagen	1892	..	..	1½	2 4·7-in. Q.F., 4 3·4-in., 6 M.	4	17·1	..	..
"	Heimdal	S.	1280	257	6	27	6	11	4	2	3000	Copenhagen	1894	..	..	1½	2 4·7-in. Q.F., 4 3-pr., 6 M.	4	17·5	..	..
"	Hekla	S.	1280	233	0	32	10	11	2	2	3000	Copenhagen	1890	..	..	1½	2 6-in. Q.F., 4 2·2-in., 6 M.	4	17·0	..	..
g. v.	Ingolf	I.	870	192	0	28	0	12	6	1	600	Copenhagen	1876	44,000	..	..	2 5·9-in. (Krupp), 4 3·4-in., 2 M.	..	10·5	130	117
g. v.	Möen	I.	356	111	0	28	10	7	6	1	523	Copenhagen	1875	..	..	..	1 10-in. (Armstrong) M.L.R., 2 3·4-in. (Krupp), 2 M.	..	9·2	20	35
corv.	Saint Thomas	W.	1572	224	0	33	0	17	0	1	1870	Copenhagen	1871	..	..	..	8 4·7-in. (Krupp), 6 M.	..	13·0	190	182
cr.	Valkyrien	S.	2900	268	0	43	6	18	0	2	5300	Copenhagen	1887 1896	..	..	2½	2 8·2-in. (Krupp), 6 5·9-in., 4 Q.F., 10 M.	5	17·0	450	300

Gunboats.—Five in number (*Lille Belt*, *Öresund*, *Store Belt*, *Grönsund*, *Guldborgsund*), of 150 to 240 tons, 200 to 400 I.H.P. *Dagmar* (training-ship), corvette. 1200 tons; *Hjaelperen* (mining), 280 tons; *Sleipnir* (ice-breaker), 1260 tons, 3000 I.H.P.
The *Beskytteren*, torpedo transport, 389 tons, 600 I.H.P., 3 1–8 in. Q.F., is in hand.

FRANCE.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
l.	A 8 (République?) / A 10 (Patrie?)	S.	14,865	434	10	79	7	27	6	3	17,475 W.T.	Brest	Bldg. Pro.	1,421,708	11–8 H.S.	12	..	4 12-in., 18 6·4-in. Q.F., 26 1·8-in., 2 1·4-in.	5 (2 sub.)	18·0	905 / 1825	793
a.g.b.	Achéron	I. & S.	1721	181	0	40	4	11	10	2	1700	Cherbourg	1885 1900	100,000	8	8	2½	1 10·8-in., 3 3·9-in. Q.F., 2 1·8-in., 4 M.	..	13·0	100	101
a.c.	Amiral Aube	S.	10,014	453	0	66	3	24	7	3	20,500 B	St. Nazaire	Bldg.	973,440	6 H.S.	5–7¾	2	2 7·6-in., 8 6·4-in. Q.F., 4 3·9-in., 26 small Q.F. and M.	4 (2 sub.)	21·0	970 / 1590	..
b.	Amiral Baudin	I. & S.	11,911	321	6	69	10	26	2	2	8320	Brest	1883 1899	600,000	21½	16½	4	2 14·6-in., 4 6·4-in. Q.F., 8 5·5-in., 25 small Q.F. and M.	4	15·0	800	630
a.c.	Amiral Charner	S.	4792	348	0	46	0	19	2	2	8300 B	Rochefort	1893	353,200	3½	2	2	2 7·6-in., 6 5·5-in. Q.F., 14 small Q.F. and M.	5	18·2	413	375
b.	Amiral Duperré	I. & S.	11,209	311	0	66	11	26	9	2	8120	La Seyne	1879 1901	570,000	21½	15½	2¼	3 13·3-in., 4 6·4-in. Q.F., 1 5·5-in., 14 4-in., 42 small Q.F. and M.*	4	14·22	850	664
a.c.	Amiral de Gueydon	S.	9517	459	0	63	8	24	7	3	20,200 Nic.	Lorient	1899	817,994	6–3¾ H.S.	8, 3¾ H.S.	2	2 7·6-in., 8 6·4-in. Q.F., 4 3·9-in., 16 1·8-in., 6 1·4-in.	2 (sub.)	21·0	1020 / 1600	612
a.c.	Amiral Pothuau	S.	5360	370	6	50	2	21	0	2	10,398 B	Havre	1895	384,000	3⅛–2	9½	3⅜	2 7·6-in., 10 5·5-in. Q.F., 16 1·8-in., 8 1·4-in.		19·2 t	538	461
t.	Amiral Tréhouart	S.	6629	293	2	58	4	23	2	2	8500 B	Lorient	1893	593,100	17¾	14½	4	2 12-in., 8 3·9-in. Q.F., 4 1·8-in. Q.F., 4 1·4-in., 8 M.	2	15·76 t	300	337
t.	Bouvet	S.	12,200	401	2	70	3	27	6	3	14,000 B	Lorient	1896	1,100,770	15¾–8 H.S.	14½ H.S.	3½ H.S.	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 8 3·9-in., 19 small Q.F. and M.	4 (2 sub.)	18·2 t	621	621
t.	Bouvines	S.	6610	293	9	58	3	23	3	2	8400 A'D	La Seyne	1892	594,640	17¾	14½	4	2 12-in., 8 3·9-in. Q.F., 4 1·8-in., 10 1·4-in. M.	2	16·05	300	323

* New armament.

t.	**Brennus** . .	S.	11,395	361	0 67	0 26	3	2	14,000 B	Lorient .	1891	991,767	15¾ comp.	15¾	4½	3 13·4-in., 10 6·4-in. Q.F., 23 small Q.F. and M.	4	17·1	800	696
a.c.	**Bruix** . .	S.	4754	365	3 46	0 19	10	2	9049 B	Rochefort .	1894	409,622	3¾	3¾	2	2 7·6-in., 6 5·5-in. Q.F., 4 2·5-in., 4 1·8 in., 6 1·4-in., M.	4	18·3 *t*	406	391
t.	**Caïman** ‡ . .	I. & S.	7239	278	3 59	0 24	7	2	6000	Toulon .	1885	..	19½	9¾	3	2 10·8-in., 6 3·9-in. Q.F., 6 1·8-in., 2 M., 6 1·4-in.	4	14·5	400	332
t.	**Carnot** . .	S.	12,008	382	2 70	6 27	3	2	16,300 *t* D'A	Toulon .	1894	1,070,088	17¾ 10¾	14½	2¾	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 4 2·5-in., 16 1·8-in., 10 1·4-in.	4 (2 sub.)	17·86 *t*	705	625
a.c.	**Chanzy** . .	S.	4933	348	0 46	0 19	2	2	8300 B	Bordeaux .	1894	360,000	3¾	2	2	2 7·6-in., 6 5·5-in. Q.F., 4 2·5-in., 6 1·8-in., 6 1·4-in., M.	4	19·0	413	375
t.	**Charlemagne** .	S.	11,275	385	6 66	6 27	6	3	14,500 B	Brest . .	1895	1,096,432	15¾	15¾	3½	4 12-in., 10 5·5-in. Q.F., 8 3·9-in., 16 1·8-in., 10 1.4-in., 8 M.	4 (2 sub.)	18·1 *t*	680 1100	631
t.	**Charles Martel**.	S.	11,880	392	6 71	0 27	6	2	14,996 *t* D'A	Brest . .	1893	1,092,830	17¾	15¾	3½	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 4 2·5-in., 14 1·8-in., 5 1·4-in.	6	18·1 *t*	677	632
a.g.b.	**Cocyte** . .	I. & S.	1714	181	10 40	4 11	10	2	1700	Cherbourg .	1887	100,000	8	8	2½	1 10·8-in., 2 3·9-in. Q.F., 2 1·8-in., 4 M.	..	13·0	100	101
a.c.	**Condé** . .	S.	10,000	453	0 63	9 24	7	3	20,500 Nic.	Cherbourg .	Bldg.	863,799	6–5 H.S.	8, 5 H.S.	2	2 7·6-in., 8 6·4-in. Q.F., 6 3·9-in., 16 1·8-in., 6 1·4-in.	5 (2 sub.)	21·0	..	..
c.b.&b.	**Courbet** .	I. & S.	10,808	312	0 67	0 25	0	2	8100† B.	Toulon .	1881 1899	800,000	15	9½	2½	4 10·8-in., 4 9·4-in., 6 5·5-in., 2 Q.F., 18 M.*	5	15·4	1000	669
a.c.	**Desaix** . .	~~S~~ shd.	7700	426	6 58	4 24	4	3	17,100 B	St. Nazaire .	1901	762,759	4	3½	2¾	8 6·4-in. Q.F., 4 3·9-in., 10 1·8-in., 4 1·4-in.‡	2	21·0	880 1200	531
c.b.&b.	**Dévastation** .	I. & S.	10,704	312	0 67	0 25	0	2	8320 B.	Lorient .	1879 1901	..	15	9½	2½	4 10·8-in., 2 9·4-in., 6 5·5-in., 4 3·9-in., 9 smaller Q.F., 18 M.*	4	15·17	950	685
a.c.b.	**Duguesclin** . .	I. shd.	6210	266	0 57	0 25	3	2	3300	Rochefort .	1883	220,000	9	8 *comp.*	2	4 9·4-in., 1 7·6-in., 6 5·5-in., 1 3·5-in. Q.F., 10 M.	2	14·0	400	430
a.c.	**DupetitThouars**	S.	9517	452	9 63	8 24	7	3	19,600 B	Toulon .	Bldg.	831,839	6–3¾ H.S.	8, 3¾ H.S.	2	2 7·6-in., 8 6·4-in. Q.F., 4 3·9-in., 16 1·8-in., 6 1·4-in.	(2 sub.)	21·0	§ 1020	612

* New armament. † Has received new boilers. ‡ Intended Armament. Reconstruction of Amiral Duperré to be completed 1901. § Including liquid fuel.

Y

FRANCE.—Armoured Ships—*continued.*

Class.	NAME	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
															Belt.	Gun Position.	Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
a.c.	Dupleix . .	~~S.~~ shd.	7700	426	6	58	4	24	4	3	17,100 B	Rochefort .	1900	652,354	4	3½	2¾	10 6·4-in. Q.F., 10 1·8-in., 6 1·4-in.	2	21·0	880	531
„	Dupuy de Lôme	S.	6406	374	0	51	6	23	6	3	14,000	Brest . .	1890	416,000	4	4	2	2 7·6-in., 6 6·4-in. Q.F., 12 2·5-in., 1·8-in., 8 M.	4	20·0	900	515
a.g.b.	Flamme . .	S.	1128	165	0	32	7	10	4	2	1500	Cherbourg .	1885	68,000	10	4	2	1 9·4-in., 1 3·5-in., 4 M.	1	13·0	120	84
b.	Formidable .	S.	12,165	321	6	69	6	26	2	2	9700*	Lorient .	1885 1899	467,520	21½	17¾	3	2 14·6-in., 8 6·4-in. Q.F., 8 5·5-in., 9 1·8-in., 14 M.**	6	16·0	900	640
c.b. & b.	Friedland .	I.	8994	317	0	58	0	29	11	1	4428	Lorient .	1873	..	8	7	..	8 10·8-in., 8 5·5-in., 20 M. .	4	13·3	800	676
c.d.s., t.	Fulminant .	I. & S.	5965	248	0	57	9	21	4	1	4500	Cherbourg .	1877	..	13	12	2	2 10·8-in., 4 1·8-in. Q.F., 6 M.	2	13·8	400	248
c.d.s., b.	Furieux . .	I. & S.	6019	247	10	59	0	21	9	2	5033 Nic.	Cherbourg .	1883 1901	264,640	20	17¾	3½	2 9·4-in., 5 Q.F., 10 M.** .	2	14·0	290	248
a.g.b.	Fusée . .	S. shd.	1142	165	0	32	7	10	4	2	1500	Lorient .	1884	68,000	10	4	2	1 9·4-in., 1 3·5-in., 4 M. .	1	13·0	120	84
t.	Gaulois . .	S.	11,275	385	6	66	6	27	6	3	14,500 B	Brest . .	1896	1,093,925	15¾	15¾	3½–1½	4 12-in., 10 5·5-in. Q.F., 8 3·9-in., 16 1·8-in., 10 1·4-in., 8 M.	6 (2 sub.)	18·0	680 / 1100	632
a.c.	Gloire . .	S.	10,000	453	0	63	9	24	7	3	20,500 Nor.	Lorient .	1900	883,269	6–5 H.S.	8, 5 H.S.	2	2 7·6-in., 8 6·4-in. Q.F., 6 3·9-in., 16 1·8 in., 6 1·4 in.	5 (2 sub.)	21·0	..	..
a.g.b.	Grenade . .	S. shd.	1089	165	0	32	7	10	4	2	1500	Lorient .	1888	68,000	10	4	2	1 9·4-in., 1 3·5-in., 4 M. .	1	13·0	120	84
t.	Henri IV. .	S.	8948	354	4	72	3	22	11	3	11,500 Nic.	Cherbourg .	1899	801,248	11–4¾ H.S.	11¾ H.S.	3	2 10·8-in., 7 5·5-in. Q.F., 12 1·8-in., 2 M.	2 (sub.)	17	725 / 1100	464
t. & b.	Hoche . .	I. & S.	10,997	333	0	65	7	27	3	2	11,300 B	Lorient .	1886 1900	700,000	18	16	3	2 13·4-in., 2 10·8-in., 12 5·5-in. Q.F., 4 2·5-in., 9 1·8-in., 12 1·4-in., 8 M.	5	16·0	800	660
t.	Iéna . . .	S.	12,052	400	9	68	2	27	6	3	15,500 B	Brest . .	1898	1,111,340	13¾–4¾ H.S.	..	2½	4 12-in., 8 6·4-in. Q.F., 8 3·9-in., 16 1·8-in., 5 1·4-in., 13 1·4-in. M.	4 (2 sub.)	18·0	820 / 1100	631

t.	Indomptable† .	I.&S.	7234	279 10	59 0	23 6	2	6605 Nic.	Lorient .	1883 1900	..	20	9¾	3	2 10·8-in., 6 3·9-in. Q.F., 6 1·8-in., 6 1·4-in., 2 M.	4	14·8	400	332
t.	Jauréguiberry .	S.	11,824	364 0	72 10	27 9	2	15,800 D'A.	La Seyne .	1893	1,069,536	17¾	14½	2¾	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 4 2·5-in., 12 1·8-in., 8 1·4-in., 8 M.	6	18·07	700	625
a.c.	Jeanne d'Arc .	S.	11,329	477 2	63 8	26 7	3	28,000 Guyot	Toulon .	1899	875,847	6–3 H.S.	6 H.S.	2·2 H.S.	2 7·6-in., 8 5·5-in. Q.F., 10 3·9-in., 16 1·8-in., 8 1·4-in., 2 M.	2 (sub.)	23	1400 2100	626
c.d.s.,t.	Jemmapes .	S.	6592	284 0	57 8	22 0	2	9250 D'A.	St. Nazaire .	1892	525,000	17¾–10	17¾	4–2¾	2 13·4-in., 4 3·9-in. Q.F., 4 1·8-in. Q.F., 10 1·4-in. M.	2	16·7	300	334
a.c.	Jules Ferry .	S.	12,416	474 0	71 2	26 3	3	24,000 W.T.	Cherbourg .	Bldg.	1,169,940	6 H.S.	5–7¾	2	4 7·6-in., 16 6·4-in. Q.F., 20 1·8-in., 4 1·4-in.	5 (2 sub.)	21·0	1350 1950	..
a.c.	Kléber .	S. shd.	7700	426 6	58 4	24 4	3	18,000 Nic.	Bordeaux .	Bldg.	770,320	4	3½	2¾	10 6·4-in. Q.F., 10 1·8-in., 6 1·4-in.	2	21·0	880	531
a.c.	Latouche-Tréville	S.	4756	348 0	46 0	19 2	2	8300 B	Havre .	1892	360,000	3⅜	3¾	2–1½	2 7·6-in., 6 5·5-in. Q.F., 4 2·5-in., 4 1·8-in., 6 1·4-in. M.	4	18·2	406	375
a.c.	Léon Gambetta	S.	12,416	474 0	71 2	26 3	3	24,000 W.T.	Brest .	Bldg.	1,169,940	6 H.S.	5–7¾	2	4 7·6-in., 16 6·4-in. Q.F., 20 1·8-in., 4 1·4-in.	5 (2 sub.)	21·0	1350 1950	..
b.	Magenta .	I.&S.	10,851	330 0	65 7	27 3	2	12,000	Toulon .	1890 1901	760,960	18	16	3	4 13·4-in., 17 5·5-in. Q.F., 4 2·5-in., 12 1·8-in., 8 M.	3	16·25	800	660
b.	Marceau .	I.&S.	10,850	330 0	65 7	27 3	2	14,000 Nic.	La Seyne .	1887 1901	769,080	18	16	3	4 13·4-in., 17 5·5-in. Q.F., 4 2·5-in. and 12 1·8-in., 8 M.	6	16·4	800	660
a.c.	Marseillaise .	S.	10,014	453 0	63 9	24 7	3	20,500 B.	Brest .	Bldg.	881,270	6 H.S.	5–7¾	2	2 7·6-in., 8 6·4-in. Q.F., 6 3·9-in., 2 2·5-in., 18 1·8-in., 6 1·4-in.	4 (2 sub.)	21·0	970 1590	..
t.	Masséna .	S.	11,924	384 10	66 0	27 0	3	13,500 D'A.	St. Nazaire .	1895	1,100,400	17¾–9¾	15¼ 15¾ H. S.	3½ H. S.	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 8 3·9-in., 12 1·8-in. and 12 1·4-in.	6 (2 sub.)	17·1 t	630	642
a.g.b.	Mitraille .	S. shd.	1128	165 0	32 7	10 4	2	1500	Rochefort	1886	70,000	10	4	2	1 9·4-in., 1 3·5-in., 4 M.	..	13·0	120 ‡	84
a.c.	Montcalm	S.	9517	452 9	63 8	24 7	3	19,600 N. S.	La Seyne .	1900	902,809	6–3¾ H.S.	8, 3¾ H.S.	2	2 7·6-in., 8 6·4-in. Q.F., 4 3·9-in., 16 1·8-in., 6 1·4-in.	2 (sub.)	21·0	1020 1600	612
b.	Neptune .	I. & S.	10,983	330 0	65 7	27 3	2	12,000 B	Brest .	1887 1901	780,000	18	16	3	4 13·4-in., 17 5·5-in. Q.F., 4 2·5-in. and 12 1·8-in., 8 M.	5	16·02	800	660
c.d.s.	Onondaga .	I.	2593	226 6	49 3	16 0	2	642	New York .	1863	..	5½	11¾	1	4 9·4-in., 4 M.	..	6·5	200	100
a.g.b.	Phlégéton	I. & S.	1796	187 0	40 4	11 10	2	1700	Cherbourg .	1890	142,000	9	8	2	1 10·8-in., 1 5·5-in. Q.F., 4 1·8-in., 4 M.		12·4	72	101
c.b. & b.	Redoutable	I. & S.	9437	318 2	64 8	25 6	2	6071	Lorient .	1876 1896	..	14	9½	2½	8 9·4-in., 6 3·9-in. Q.F., 2 Q.F., 12 M.**	4	14·66	1000	700

* Has received new boilers. † New armament, armour, and approximately reduced displacement given. ** New armament. ‡ Including liquid fuel.

Reconstruction of Furieux, Magenta, Marceau and Neptune to be completed 1901.

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Material.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
b.	Requin	~~I. & S.~~	7822	279	10	59	0	24	7	2	7000 Nic.	Bordeaux	1885 1900	..	19½	9¾	3	2 10·8-in., 6 3·9-in. Q.F., 2 1·8-in., 6 1·4 in., 12 M.*	4	15·0	400	332
t.	Saint Louis	S.	11,275	385	6	66	6	27	6	3	14,500 B	Lorient	1896	1,080,997	15¾ H.S.	3–15¾ H.S.	3½	4 12-in., 10 5·5-in. Q.F., 8 3·9-in., 16 1·8-in., 10 1·4-in., 8 M.	4 (2 sub.)	18·0	820 1150	631
a.g.b.	Styx	I. & S.	1796	187	0	40	4	11	10	2	1700	Cherbourg	1892	142,000	9	8	2	1 10·8-in., 1 5·5-in. Q.F., 4 1·8-in., 4 M.	..	13·0	72	101
t.	Suffren	S.	12,728	411	9	70	4	27	6	3	16,500 Nic.	Brest	1899	1,195,564	11¾–5 H.S.	..	2¾	4 12-in., 10 6·4-in. Q.F., 8 3·9-in., 20 1·8-in.	4 (2 sub.)	18·0	820 1100	..
a.c.	Sully	S	10,000	453	0	63	9	24	7	3	20,000 B.	La Seyne	Bldg.	954,536	6–5 H.S.	8,5 H.S.	2	2 7·6-in., 8 6·4-in. Q.F., 6 3·9-in., 16 1·8-in., 6 1·4-in.	5 (2 sub.)	21·0	..	..
c.d.s., t.	Tempête	I. & S.	4869	248	0	57	9	16	9	1	2193	Brest	1876	..	13	12	2	2 10·8-in., 4 1·8-in. Q.F., 6 M.	2	11·7	200	197
b.	Terrible	I. & S.	7575	279	10	59	0	24	7	2	6230	Brest	1881 1899	..	19½	17¾	3	2 13·4-in., 6 3·9-in. Q.F., 2 1·8-in., 12 M.*	4	14·5	400	332
c.d.s., b.	Tonnant	I. & S.	5091	248	7	58	5	17	3	1	1935	Rochefort	1880	..	18	14½	3	2 13·4-in., 4 M.	..	11 5	200	197
c.d.s., t.	Tonnerre	I. & S.	5858	248	0	57	9	21	4	1	4165	Toulon	1875	..	13	12	2	2 10·8-in., 4 1·8-in. Q.F., 6 M.	2	14·01	400	249
c.d.s., t.	Valmy	S.	6592	293	9	57	4	23	3	2	8954	St. Nazaire	1892	578,957	17¾	17¾	4	2 13·4-in., 4 3·9-in. Q.F., 4 1·8-in. 10 M.	2	16·7	300	297
a.c.	Vauban	I.	6208	267	9	57	3	24	0	2	4560	Cherbourg	1882	..	10	8	2	4 9·4-in., 1 7·6-in., 6 5·5-in., 12 M.	2	14·32	550	440
c.d.s., t.	Vengeur	I. & S.	4709	248	0	57	9	16	9	2	2030	Cherbourg	1878	..	13	12	2	2 12·5-in., 4 1·8-in. Q.F., 6 M.	2	10·83	200	107
a.c.	Victor Hugo	S.	12,500	480	7	70	2	26	11	3	27,500 W.T.	Toulon	Bldg.	1,169,940	6 H.S.	5–7¾	2	4 7·6-in., 16 6·4-in. Q.F., 2 1·8-in., 2 1·4 in.	5 (2 sub.)	22·0	1320 2100	728

* New armament.

FRANCE.—Cruising Ships, &c.

Class.	NAME.	Material.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
2nd cl. *cr.*	**Alger**	S.	4382	346	0	45	3	19	6	2	8254 B	Cherbourg	1889	280,000	..	3½	4 6·4-in. Q.F., 6 5·5-in., 10 other Q.F., 10 M.	4	19·61	860	325
g. v.	**Amiral Parseval**	W. & I.	869	197	6	28	0	12	2	1	918	Rochefort	1879	33,772	..	..	4 5·5-in., 4 M.	..	12·33	150	116
cr.	**Amiral Rigault de Genouilly.**	W.	1756	236	3	35	5	17	0	1	2043 B	Brest	1876	62,796	..	..	8 5·5-in., 8 M.	..	14·49	200	198
cr.	**Aréthuse**	W.	3665	277	6	43	6	21	9	1	4200	Toulon	1882	..	..	..	4 6·4-in., 22 5·5-in., 8 M.	..	14·0	500	474
g. v.	**Aspic**	C.	476	145	4	23	10	10	6	1	453	Rochefort	1880	..	..	..	2 5·5-in., 2 3·9-in.	..	10·3	50	80
to. g. b.	**Bombe**	S.	420	196	10	21	7	5	11	2	2000 D'A.	Havre	1885	..	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
2nd cl. *cr.*	**Bugeaud**	S.	3740	308	6	43	6	20	6	2	9000 B	Cherbourg	1893	308,650	2 shield	3	6 6·4-in. Q.F., 4 3·9-in., 8 1·8-in., 11 1·4-in.	6	18·9	587	358
g. v.	**Capricorne**	W.	483	148	4	23	10	10	5	1	443	Havre	1882	..	..	..	2 5·5-in., 2 3·9-in.	..	11·18	70	80
to. g. b.	**Casabianca**	S.	960	262	6	26	10	11	6	2	5200 D'A.	Bordeaux	1895	98,985	..	½	1 3·9-in. Q.F., 3 2·5-in., 5 1·8-in., 4 1·4-in.	..	22·0	116	143
2nd cl. *cr.*	**Cassard**	S.	3952	325	6	44	11	20	6	2	10,143 D'A.	Cherbourg	1896	318,712	2 shield	3	6 6·4-in. Q.F., 4 3·9-in., 10 1·8-in., 3 1·4-in., 2 M.	2	19·8	630	385
to. g. b.	**Cassini**	S.	958	262	6	27	4	11	6	2	5500 D'A.	Bordeaux	1894	98,500	..	½	1 3·9-in. Q.F., 3 2·5-in. 4 1·4-in.	2	21·2	110	118
2nd cl. *cr.*	**Catinat**	S. Shd.	4065	331	10	44	8	21	1	2	9000 B	Havre	1896	324,992	2 shield	3	4 6·4-in. Q.F., 10 3·9-in., 10 1·8-in., 4 1·4-in. M.	2	19·0	563	384
2nd cl. *cr.*	**Cécille**	I. & S.	5933	378	9	49	3	19	9	2	10,200	La Seyne	1888	299,666	..	4	8 6·4-in. Q.F., 10 5·5-in., 6 1·8-in., 14 M.	4	19·0	940	486
2nd cl. *cr.*	**Chasseloup-Laubat**	S.	3758	308	6	43	6	20	10	2	9000 D'A.	Cherbourg	1893	256,320	..	3	6 6·4-in. Q.F., 4 3·9-in., 8 1·8-in., 12 1·4-in. M.	6	19·25	587	358
1st cl. *cr.*	**Châteaurenault**	S. Shd.	8018	442	10	55	9	24	6	3	23,000 N.S.	La Seyne	1898	606,656	2 shield	2½	2 6·4-in. Q.F., 6 5.5-in., 10 1·8-in.	..	23	1400 / 2100	625

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material.	Displacement.	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Coëtlogon**	S.	1932	312	0	30	5	14	0	2	5800	St. Nazaire	1889	134,000	..	1½	4 5·5-in. Q.F., 3 other Q.F., 4 M.	5	19·3	200	190
g. v.	**Comète**	C.	495	151	6	24	9	10	6	1	631	Cherbourg	1884	..	..	..	2 5·5-in., 2 3·9-in., 2 M.	..	12.2	60	84
to. cr.	**Condor**	S.	1243	216	6	29	3	15	5	2	3800	Rochefort	1885 1896	80,000	..	1½	5 3·9-in. Q.F., 1 2·5-in., 6 M.	5	17·7	160	134
3rd cl. *cr.*	**Cosmao**	S.	1954	312	0	30	5	14	0	2	6000	Bordeaux	1888	133,000	..	1½	4 5·5-in. Q.F., 8 other Q.F., 4 M.	5	20·5	200	190
to. g. b.	**Couleuvrine**	S.	435	196	10	21	7	5	11	2	2047	Havre	1885	33,778	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
to. g. b.	**Dague**	S.	408	196	10	21	7	5	11	2	2000	Havre	1885	36,119	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
2nd cl. *cr.*	**D'Assas**	S.	4000	325	6	44	11	20	6	2	9500 D'A.	St. Nazaire	1896	292,682	2 shield	3	6 6·4-in. Q.F., 4 3·9-in., 10 1·8-in., 11 1·4-in.	2	19·25	630	393
2nd cl. *cr.*	**Davout**	S.	2291	295	4	40	0	17	6	2	9000 Nic.	Toulon	1890	221,827	..	3	6 6·4-in. Q.F., 4 3·9-in., 4 2·5-in., 4 1·8-in., 6 M.	4	20·07 *t.*	600	336
g. v.	**Décidée**	S.	645	184	8	26	3	12	2	1	1000 Nic.	Lorient	1899	54,100	..	..	2 3 9-in. Q.F., 4 2·5-in., 4 1·4-in.	..	13·0	99	99
1st cl. *cr.*	**D'Entrecasteaux**	S. shd.	8114	383	7	58	6	25	9	2	13,500	La Seyne	1896	667,740	10–2¾ H.S.	4	2 9·4-in., 12 5·5-in Q.F., 12 1·8-in.	6	19·2 *t*	650	521
2nd cl. *cr.*	**Descartes**	S. shd.	3990	326	0	42	4	21	4	2	9000 B	St. Nazaire	1894	334,725	..	1½	4 6·4-in. Q.F., 10 3 7-in., 8 1·8-in., 4 1·4-in.	2	21·0 *t*	552	386
cr.	**D'Estaing**	W. & I.	2435	262	5	37	5	18	8	1	3700	Brest	1879	84,718	..	..	15 5·5-in., 8 M.	..	15·31	300	264
3rd cl. *cr.*	**D'Estrées**	S. shd.	2452	311	8	39	4	17	8	2	8500 Nor.	Rochefort	1897	208,200	..	1½	2 5·5-in. Q.F., 4 3·9-in., 8 1·8-in., 2 1·4-in.	..	20·5	345 480	234
to. g. b.	**D'Iberville**	S.	967	262	6	27	0	11	2	2	5060 D'A.	St. Nazaire	1893	99,120	..	½	1 3·9-in. Q.F., 1 2·5-in., 4 1·4-in.	6	21·4	117	118
to. g. b.	**Dragonne**	S.	410	196	10	21	7	5	11	2	2000	Havre	1885	36,074	..	..	4 5·5-in. Q.F., 3 M.	2	18·0	100	63
cr.	**Dubourdieu**	W.	3577	253	7	46	6	22	10	1	3300	Cherbourg	1884	154,553	..	..	4 6·4-in., 12 5·5-in., 10 M.	2	14·0	600	496
2nd cl. *cr.*	**Du Chayla**	S. shd.	3952	325	6	44	11	20	6	2	10,009 D'A.	Cherbourg	1895	315,835	2 shield	3	6 6·4-in. Q.F., 4 3·9-in., 10 1 8-in., 3 1·4-in., 2 M.	2	20·2 *t*	624	385

to. g. b.	**Dunois** (ex M 3)	S.	896	256	0	27	10	12	8	2	7000 N.S.	Cherbourg	1897	123,383	..	..	6 2·5-in. Q.F., 6 1·8-in.	..	23·0	137	128
cr.	**Duquesne**	I. & W.	5986	333	5	50	3	25	6	1	6589	Rochefort	1876	221,570	..	..	7 6·4-in. Q.F., 14 5·5-in., 8 M.	..	16·8	900	550
cr.	**Éclaireur**	I. & W.	1769	236	3	35	5	17	0	1	2050	Toulon	1877	16,232	..	..	8 5·5-in., 6 M.	..	15·0	200	195
to. cr.	**Epervier**	S.	1288	216	6	29	3	15	5	2	3200	Rochefort	1885	80,000	..	1½	5 3·9-in. Q.F., 1 2·5-in., 6 M.	5	17·6	160	134
g. v.	**Etoile**	C.	502	149	3	24	7	8	4	2	450	France.	1885	29,782	..	..	6 3·9-in., 1 2·5-in., 2 M.	..	10·0	60	77
cr.	**Fabert**	W.	2100	294	4	36	0	18	4	1	1107	Rochefort	1874	61,967	..	..	8 5·5-in., 4 M.	..	12·42	300	218
to. cr.	**Faucon**	S.	1239	216	6	29	3	15	5	2	3200	Toulon	1887	80,000	..	1½	5 3·9-in. Q.F., 1 2·5-in., 6 M.	5	18·0	150	134
to. g. b.	**Flèche**	S.	425	196	10	21	7	5	11	2	2000	Havre	1885	37,517	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
3rd cl. *cr.*	**Fleurus**	S.	1310	229	8	29	2	15	4	2	4000 Nic.	Cherbourg	1893	128,530	..	..	5 3·9-in. Q.F., 6 1·8-in., 4 M.	..	17·6 *t*	118	179
„ „	**Forbin**	S	1820	312	0	30	5	16	0	2	5700	Rochefort	1888	123,739	..	1½	4 5·5-in. Q.F., 8 other Q.F., 4 M.	5	20·6	200	190
cr.	**Forfait**	W. & I.	2464	249	4	38	0	18	0	1	2764	Toulon.	1879	77,019	..	..	15 5·5-in., 8 M.	..	13·44	400	264
cr.	**Foudre** (torpedo transport)	S.	6090	370	6	52	6	23	6	2	11,900 D'A. *t*	Bordeaux	1895	407,712	..	3½	10 3·9-in. Q.F., 4 2·5-in., 4 1·4-in.	..	19·9 *t*	840	410
2nd cl. *cr.*	**Friant**	S.	3739	308	6	43	6	20	10	2	9000 Nic.	Brest	1893	308,750	..	3	6 6·4-in. Q.F., 4 3·9-in. 8 1·8-in. 6 1·4-in.	2	18·19	587	358
g. v.	**Fulton**	W.	913	199	5	28	5	12	8	1	850	Lorient	1887	37,000	..	..	2 5·5-in., 1 3·9-in., 5 M.	..	13·0	160	116
„	**Gabès**	C.	493	151	6	24	9	10	6	1	450	Rochefort	1884	28,624	..	..	2 5·5-in., 2 3·9-in.	..	11·0	60	84
3rd cl. *cr.*	**Galilée**	S.	2317	330	2	34	6	17	10	2	6600 B	Rochefort	1896	208,152	2 shields	1½	4 5·5-in. Q.F., 2 3·9-in., 8 1·8-in., 8 1·4-in.	..	20·0	226	248
1st cl. *cr.*	**Guichen**	S. shd.	8277	436	4	54	10	24	7	3	24,000 D'A	St. Nazaire.	1897	611,945	2 shield	2½	2 6·4-in. Q.F., 6 5·5-in., 10 1·8-in.	..	23·0	1460	625
cr.	**Iphigénie** (Training ship)	W.	3431	244	6	46	6	22	4	1	2800	..	1881	115,323	..	..	6 6·4-in., 2 3·5-in., 10 M.	1	14·6	400	391

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
3rd cl. *cr.*	Infernet	S shd.	2452	311	8	39	4	15	6	2	8500 Nor.	Bordeaux	1899	193,000	..	..	2 5·5-in. Q.F., 4 3·9-in. 8 1·8-in.	..	20·5	345 480	234
2nd cl. *cr.*	Isly	S.	4477	346	0	43	6	19	6	2	8100	Brest	1891	252,760	..	3	4 6·4-in. Q.F., 6 5·5-in., 14 2·5-in. and 1·8-in., 8 M.	5	18·3	880	332
2nd cl. *cr.*	Jurien de la Gravière	S. shd.	5605	440	0	48	8	22	0	3	17,000 Guyot	Lorient	1899	475,979	..	3	8 6·4-in. Q.F., 12 1·8-in.	2	23·0	600 900	511
2nd cl. *cr.*	Jean Bart	S.	4109	346	0	43	6	19	6	2	8000	Rochefort	1889	283,240	..	4	4 6·4-in. Q.F., 6 5·5-in., 14 2·5-in., and 1·8-in., 8 M.	5	19·0	940	332
g. v.	Kersaint	S. shd.	1243	226	0	34	5	15	0	1	2200	Rochefort	1897	107,933	..	..	1 5·5-in. Q.F., 5 3·9-in., 7 1·4-in.	..	15·0	199	110
to. g. b.	La Hire	S.	896	256	0	27	10	12	9	2	7000 N.S.	Cherbourg	1898	123,383	..	..	6 2·5-in. Q.F., 6 1·8-in.	..	23·0	137	128
3rd cl. *cr.*	Lalande	S.	1926	311	6	31	2	14	0	2	6000	Bordeaux	1888	133,800	..	1½	6 5·5-in. Q.F., 8 other Q.F., 4 M.	5	22·0	200	190
to. g. b.	Lance	S.	402	196	10	21	7	5	11	2	2000 Du T.	Havre	1886	39,964	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
cr.	Lavoisier	S	2317	330	2	34	6	17	10	2	6400 B	Rochefort	1897	202,024	2 shield	1½	4 5·5-in. Q.F., 2 3·9-in., 8 1·8-in., 2 1·4-in., 4 M.	2	20·0	226	248
to. g. b.	Léger	S.	517	197	0	23	0	10	6	2	2360 B	Lorient	1891	52,000	..	..	1 3·9-in. Q.F., 3 2·5-in., 4 1·4-in.	3	18·8	130	69
to. g. b.	Lévrier	S.	505	197	0	23	0	10	6	2	2240 B	Lorient	1891	52,000	..	..	1 3·9-in. Q.F., 3 2·5-in., 4 1·4-in.	3	18·5	130	69

3rd cl. *cr.*	**Linois**	S.	2345	321	6	34	6	17	5	2	6600	La Seyne	1894	163,014	3·9	1½	4 5·5-in. Q.F., 2 3·9-in., 8 1·8-in., 4 1·4-in., 4 M.	4	20·5	200	248
g. v.	**Lion**	C.	503	151	6	24	9	10	6	1	576	Havre	1884	23,146	..	..	2 5·5-in., 4 M.	..	11·8	70	84
"	**Lutin**	C.	493	141	9	23	11	9	4	1	373	Cherbourg	1877	20,295	..	..	2 5·5-in., 2 3·9-in.	..	10·0	60	77
"	**Lynx**	C.	485	141	9	23	11	9	4	1	427	Cherbourg	1878	21,478	..	..	2 5·5-in., 2 3·9-in.	..	10·38	60	77
"	**Météore**	C.	504	151	6	24	9	10	6	1	434	Cherbourg	1886	26,262	..	..	2 5·5-in., 3 M.	..	10·0	70	77
3rd cl. *cr.*	**Milan**	S.	1733	303	2	32	10	14	7	2	3986 B	St. Nazaire	1886	89,058	..	..	5 3·9-in. Q.F., 8 M.	2	18·1	400	186
cr.	**Naiade**	I. shd.	3686	246	0	47	2	22	10	1	2700	Toulon	1881	128,275	..	..	2 6·4-in., 18 5·5-in., 10 M.	..	13·68	500	490
cr.	**Nielly**	W. & I.	2400	262	5	37	5	18	8	1	2921	Brest	1880	84,037	..	..	15 5·5-in., 8 M.	..	15·23	300	264
2nd cl. *cr.*	**Pascal**	S.	4015	326	0	42	4	21	4	2	9000 *t*, B	Toulon	1895	322,321	..	1½	4 6·4-in. Q.F., 10 3·9-in., 8 1·8-in., 4 1·4-in. M.	2	20·0 *t*	650	378
cr.	**Primauguet**	W. & I.	2447	262	5	37	5	18	8	1	2268	Rochefort	1882	108,592	..	..	15 5·5-in., 8 M.	..	14·50	300	264
2nd cl. *cr.*	**Protet**	S. shd.	4055	331	10	44	8	21	1	2	9300	Bordeaux	1898	324,992	2 shield	2½	4 6·4-in. Q.F., 10 3·9-in., 10 1·8-in., 2 1·4-in.	2	20·2 *t*	563	384
cr.	**Roland**	W.	2476	249	4	38	0	17	7	1	2294	Cherbourg	1882	84,184	..	..	15 5·5-in., 8 M.	..	14·50	350	264
to. g. b.	**Sainte Barbe**	S.	437	196	10	21	7	5	11	2	2000	Rouen	1885	43,233	..	1½	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
"	**Salve**	S.	413	196	10	21	7	5	11	2	2000	Rouen	1886	42,538	..	1½	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
g. v.	**Scorpion**	C.	505	151	6	24	9	10	6	1	511	Havre	1883	23,459	..	..	2 5·5-in., 3 M.	..	11·0	70	84

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
2nd cl. *cr.*	**Sfax**	S.& W.	4728	288	9	49	3	24	9	2	6522	Brest	1884 1898	200,000	..	1½	6 6·4-in. Q.F., 10 5·5-in., 6 1·8-in., 6 1·4-in., 4 M.†	2	16·84	715	473
2nd cl. *cr.*	**Suchet**	S.	3440	318	3	43	6	17	6	2	9000	Toulon	1893	226,360	..	3	4 6·4-in. Q.F., 4 3·9-in., 4 1·8-in., 8 1·4-in., 6 M.	7	20·4 *t*	480	246
3rd cl. *cr.*	**Surcouf**	S.	2044	312	0	30	5	14	0	2	6000	Cherbourg	1888	131,200	..	1½	4 5·5-in. Q.F., 8 other Q.F., 4 M.	5	20 5	200	190
g. v.	**Surprise**	S.	627	184	8	24	7	12	3	1	853 *t*	Havre	1895	50,954	..	..	2 3·9-in. Q.F., 4 2·5-in., 4 1·4-in.	..	13·4 *t*	73	99
1st cl. *cr.*	**Tage**	S. shd.	7589	390	0	53	8	22	10	2	12,410	St. Nazaire	1886	93,857	..	..	8 6·4-in., 10 5·5-in., 2 2·5-in., 6 Q.F., 14 M.	7	19·0	1000	400
2nd cl. *cr.*	**Tourville***	I. & W.	5576	333	5	50	3	25	4	1	7466	La Seyne	1876	271,499	..	..	7 6·4-in. Q.F., 14 5·5-in., 8 M.	..	16·89	800	550
3rd cl. *cr.*	**Troude**	S.	2026	311	6	31	2	14	0	2	6000	Bordeaux	1888	33,383	..	1½	4 5·5-in. Q.F., 8 other do., 4 M.	5	20·9	200	190
t. g. b.	**Vautour**	S.	1235	216	6	29	3	15	5	2	3391	Toulon	1886	87,733	..	1½	5 3 9-in. Q.F., 1 2 5-in. do., 6 M.	5	17·3	150	134
g. v.	**Vipère**	C.	486	145	4	23	10	10	6	1	441	Rochefort	1881	26,835	..	..	2 5·5-in., 2 3·9-in.	.	10·3	60	80
”	**Voltigeur**	W. & I.	943	199	5	28	5	12	7	1	999 B	Brest	1878	23,077	..	..	4 5·5-in., 4 M.	.	12·48	150	116
t. g. b.	**Wattignies**	S.	1292	230	0	29	3	15	0	2	4189	Rochefort	1891	111,000	..	..	5 3·9-in. Q.F., 6 1·8-in., 7 1·4-in., M.	4	18·61	160	180
g. v.	**Zélée**	S.	646	185	6	26	0	10	6	1	1000 Nic.	Rochefort	1899	..	..	..	2 3·9-in. Q.F., 4 2·5-in., 4 1·4-in.	..	13·0	..	75

* New engines, 1893. † New armament.

Shallow-draught gunboats Argus and Vigilante launched at Chiswick (Thornycroft) 1900:—displacement, 122 tons; length, 145 ft.; beam, 24 ft.; draught, 2 ft.; 2 screws; 550 I.H.P.; 13 knots; 2 3·5-in., 4 1·4-in. Q.F. guns; complement, 30; coal capacity, 80.

Merchant Cruisers (Auxiliary to French Navy).

To what Company belonging.	Name.	Register Tonnage.	Length.	Beam.	Depth.	H.P. (nominal.)	Speed.	When built.
		Tons.	Feet.	Feet.	Feet.		Knots.	
Compagnie Générale Transatlantique*	La Touraine	8893	520·2	56·0	34·6	1616	19	1890
	Duc de Bragance	2096	334·6	34·2	16·8	426	17½	1889
	Eugène Pereire	2078	334·6	35·1	23·9	437	17½	1888
	Général Chanzy	2299	341·2	35·7	15·5	478	17½	1891
	La Bretagne	7112	495·4	51·8	34·5	1149	17½	1886
	La Champagne	7087	493·4	51·8	34·5	1149	17½	1885
	La Gascogne	7395	495·4	52·2	34·8	1308	17½	1886
	Maréchal Bugeaud	2206	342·5	34·1	23·0	482	17½	1890
	Ville d'Alger	2211	342·7	36·1	23·0	208	17½	1890
	La Navarre	6648	471·0	50·5	36·4	983	17	1892
	La Normandie	6283	459·3	49·2	34·1	1147	16	1882
	Ville de Tunis	1966	317·3	34·6	16·8	444	15½	1884
	Moïse	1873	310·0	33·5	16·7	443	15	1880
	St. Augustin	1854	314·0	33·8	16·5	443	15	1880
	Versailles	4336	373·7	45·3	27·0	780	..	1882
	Ville de Madrid	1874	308·7	33·5	16·7	370	15	1880
	Ville de Naples	1879	311·6	34·1	16·7	506	15	1881
	Armand Béhic	6467	486·6	50·1	36·8	821	17½	1892
Messageries Maritimes†	Australien	6428	482·3	49·2	34·1	818	17½	1889
	Polynésien	6506	482·3	49·2	34·1	818	17½	1890
	Ville de la Ciotat	6461	485·8	49·9	36·8	819	17½	1892
	Ernest Simons	4562	442·9	47·1	36·7	727	..	1893
	Indus	6357	446·2	50·8	36·1	417	..	1897
	Brésil	5876	463·9	46·4	32·5	743	16½	1889
	Chili	6375	462·6	47·6	36·7	719	..	1894
	Cordillère	6379	462·6	47·6	36·1	721	..	1895
	La Plata	5807	462·6	45·9	32·5	520	16½	1889

NOTE.—The armament for the larger ships is 7 5·5-in and smaller quick-firers.

* Also the Lorraine and Savoie, 11,200 tons, and the Aquitaine, 8810 tons.

† Also the Tonkin, 7364 tons, and the Annam, 6343 tons.

GERMANY.—Armoured Ships.

Class.	NAME.	Material.	Displacement.	Length.		Beam.		Draught.		* Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
															Belt.	Gun Position	Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	ins.	ins.	ins.			knots.	tons.	
c. d s.	Aegir	S.	3600	236	6	50	6	17	9	2	4800 T.	Kiel	1895	233,500	9½ H.S.	8¾ H.S.	2	3 9·4-in., 10 3·4-in. Q.F. 6 M.	3 (1 sub.)	14·8	225 †	276
a. c.	B.	S.	8868	396	0	64	3	25	3	3	15,000 Dürr.	Kiel	Bldg.		4 K.S.	6 K.S.	2¾	4 8·2-in., 10 5·9-in. Q.F., 12 3·4-in., 10 1·4-in., 4 M.	4 (3 sub.)	20·5	950	528
b.	Baden	I.	7441	321	6	60	0	15	8	2	6200 Dürr.	Kiel	1880 1897	444,886	16	10	3	6 10·2-in., 8 3·4-in. Q.F., 8 1·4-in., 1 l., 6 M.	5 (2 sub.)	14·0	700	376
a. g. b.	Basilisk	I.	1109	154	3	36	0	10	2	2	759	Bremen	1878	58,042	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	9·0	40	76
b.	Bayern	I.	7441	321	6	60	0	19	8	2	6326 W.T.	Kiel	1878 1896	406,660	16	10	3	6 10·2-in., 8 3·4-in. Q.F., 8 1·4-in., 1 l., 6 M.	5 (2 sub.)	14·0	700	376
c. d. s.	Beowulf	S.	3500	259	2	49	3	17	9	2	4800 T.S.	Bremen	1890	175,000	9½	8	1¼	3 9·4-in., 8 3·4-in. Q.F., 6 M.	4	14·8	225	276
b.	Brandenburg	S.	10,100	354	4	65	0	24	7	2	9640	Stettin (Vulcan)	1891	606,500	15¾ comp.	11¾ comp.	2½	6 11-in., 6 4·1-in. Q.F., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	16·5	750	552
a. g. b.	Biene	I.	1109	154	3	36	0	10	2	2	759	Bremen	1876	62,853								
a. g. b.	Camäleon	I.	1109	154	3	36	0	10	2	2	759	Bremen	1878	57,564	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
"	Crocodil	I.	1109	154	3	36	0	10	2	2	759	Bremen	1879	57,237								
b.	Deutschland	I.	7319	280	0	62	4	24	7	1	5360	Poplar	1874	412,022	10	8	2	8 10·2-in., 7 5·9-in., 9 3·4-in. Q.F., 12 M., 2 l.	5	14·5	710	668

t.	Friedrich der Grosse	I.	6770	307	0	53	6	24	7	1	5400	Kiel	1874	365,170	9½	8 br. 10 tur.	..	4 10·2-in., 2 6·6-in., 10 3·4-in. Q.F., 8 M., 2 l.	4	14·0	550	537
a. c.	Fürst Bismarck	S. shd.	10,650	393	8	66	9	26	0	3	14,000 Dürr.	Kiel	1897	..	7¾ H. S.	7¾ H. S.	3	4 9·4-in., 12 5·9-in. Q.F., 10 3·4-in., 10 1·4-in., 8 M.	6 (5 sub.)	19.0	1000†	565
c. d. s.	Frithjof	S.	3500	240	0	49	3	17	9	2	4800 T. S.	Bremen	1891	175,000	9¼ H. S.	7¾ H. S.	1¼	3 9·4-in., 8 3·4-in. Q.F., 6 M.	4	14·8	225	276
c. d. s.	Hagen*	S.	3500	267	0	49	3	17	9	2	5250 T.	Kiel	1893 1900	..	9¼ H. S.	7¾ H. S.	1¼	3 9·4-in., 10 3·4-in. Q.F., 6 1·4-in., 8 M.	4 (3 sub.)	15·0	580	297
c. d. s.	Heimdall	S.	3500	240	0	49	3	17	9	2	4393 T. S.	Wilhelmshaven	1892	233,500	9½ H. S.	7¾ H. S.	1½	3 9·4-in., 8 3·4-in. Q.F., 6 M.	4	14·8	225	276
c. d. s.	Hildebrand	S.	3500	240	0	49	3	17	9	2	4413 T. S.	Kiel	1892	218,000								
a. g. b.	Hummel	I.	1109	143	0	36	0	10	2	2	759	Bremen	1881	56,741	8	8	2	1 12-in., 2 3 3-in., 2 M.	2	10·0	40	76
b.	Kaiser	I.	7531	292	0	62	4	24	7	1	5700	Poplar	1874	411,301	10	10	2	8 10·2-in., 1 5·9-in., 6 4-in., 9 3·4-in. Q.F., 2 M., 2 l.	5	14·6	710	668
t.	Kaiser Barbarossa										13,000 C. & T.	Danzig (Schichau)	1896									
t.	Kaiser Friedrich III.										13,000 C. & T.	Wilhelmshaven	1900									
t.	Kaiser Wilhelm II.	S.	11,130	377	4	66	10	25	6	3	13,000 C.&T.S.	Wilhelmshaven	1897	706,000	11¾ H. N. S.	9¾–6 H. N. S.	3	4 9·4-in. Q.F., 18 5·9-in. Q.F., 12 3·3-in., 12 1·4-in., 8 M.	6 (5 sub)	18·0	650 1000	700
t.	Kaiser Wilhelm der Grosse										13,000 C.&T.S.	Kiel (Germania)	1899									
t.	Kaiser Karl der Grosse										13,000 C.&T.S.	Hamburg (Blohm & Voss)	1899									
t.	D. E. F. G.	S.	11,800	393	9	68	2	24	10	3	14,000 C.&T.S.	Danzig, Kiel (Germania), Stettin, Wilhelmshaven	Bldg.	832,500	9–4 K.S.	10–6 K.S.	3	4 9·4-in. Q.F., 18 5·9-in. Q.F., 12 3·3-in., 12 1·4 in., 8 M.	6 (5 sub.)	1·0	650 1000	715
t.	H. J.‡	S.	13,000										Pro.									
b.	König Wilhelm	I.	9757	355	0	60	0	26	7	1	8350	Blackwall	1868 1896	505,141	12	6	2½	20 5·9-in. Q.F., 18 3·4-in., 8 M., 4 l.	5	14·7	700	759
a. c.	König Wilhelm (Ersatz)	S.	8868	396	0	64	3	25	3	3	15000 Dürr.	Hamburg	Pro. 1901		4 K.S.	6 K.S.	2¾	4 8·2-in., 10 5·9-in. Q.F., 12 3·4-in., 10 1·4-in., 4 M.	4 (3 sub.)	20 5	950	528
b.	Kurfürst Friedrich Wilhelm.	S.	10,100	354	4	65	0	24	7	2	9959	Wilhelmshaven	1891	653,000	15¾ comp.	11¾ comp.	2½	6 11-in., 6 4·1-in. Q.F., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	16·0	750	552
a. g. b.	Mücke	I.	1109	154	3	36	0	10	2	2	759	Bremen	1877	60,960	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76

* The Hagen has been reconstructed, and lengthened 27 ft. by the addition of a new middle section. † Also liquid fuel. ‡ Estimates, 1901; particulars not known.

GERMANY.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.	in.			knots.	tons.	
a. g. b.	**Natter**	I.	1109	154 3	36 0	10 2	2	759	Bremen	1880	52,822	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
c. d. s. b.	**Odin**	S.	3600	236 6	50 6	17 9	2	4800 T. S.	Danzig	1894	..	9½ H. S.	8¾ H. S.	2	3 9·4 in., 10 3·4-in. Q.F., 6 M.	3 (1 sub.)	15·0	225†	266
b.	**Oldenburg**	S.	5200	246 0	59 0	19 6	2	3900	Stettin	1884	235,342	13 comp.	8 comp.	1	8 9·4-in. (Krupp), 2 3·4-in. Q.F., 6 M.	4	13·5	475	356
t.	**Preussen**	I.	6770	308 6	53 6	24 7	1	4383	Stettin	1873	351,904	9	8 10	..	4 10·2-in. (Krupp), 2 6·6-in., 10 3·4-in. Q.F., 6 M., 2 l.	4	14·0	550	537
a. c.	**Prinz Heinrich (A)**	S.	8868	396 0	64 3	25 3	3	15000 Dürr.	Kiel	1900	..	4 K.S.	6 K.S.	2¾	2 9·4-in., 10 5·9-in. Q.F., 10 3·4-in., 10 1·4-in., 4 M.	4 (3 sub.)	20·5	950	528
b.	**Sachsen**	I.	7441	321 6	59 0	21 0	2	6000 W. T.	Stettin	1877 1896	422,178	15¾	15¾	3	6 10·2-in. (Krupp), 8 3·4-in. Q.F., 8 1·4-in., 1 l., 6 M.*	5 (2 sub.)	14·0	700	376
c. d. s.	**Siegfried**	S.	3500	240 0	49 3	17 9	2	4800 T. S.	Kiel (Germania)	1889	175,000	9½	7¾	1¼	3 9·4-in., 6 3·4-in. Q.F., 6 M.	4	14·8	225†	276
a. g. b.	**Salamander**	I.	1109	154 3	36 0	10 2	2	759	Bremen	1880	56,914	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
”	**Skorpion**	I.	1109	154 3	36 0	10 2	2	759	Bremen	1877	60,796								
”	**Viper**	I.	1109	154 3	36 0	10 2	2	759	Bremen	1876	61,463								
”	**Wespe**	I.	1109	154 3	36 0	10 2	2	759	Bremen	1876	53,771								
b.	**Weissenburg**	S.	10,100	354 4	65 0	24 7	2	9000	Stettin (Vulcan)	1891	659,475	15¾	11¾	2¼	6 11-in., 6 4·1-in. Q.F., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	16·0	750†	552
t.	**Wittelsbach**	~~S.~~	~~11,800~~	414 8	68 2	24 10	3	15,000 Dürr.	Wilhelmshaven	1900	832,500	9–4 K.S.	10–6 K.S.	3	4 9·4-in. Q.F., 18 5·9-in. Q.F., 12 3·3-in., 12 1·4-in., 8 M.	6 (5 sub.)	19·0	650 1000	715
b.	**Wörth**	S.	10,100	354 4	65 0	24 7	2	10,224 (*t*)	Kiel	1892	595,250	15¾	11¾	2¼	6 11-in., 6 4·1-in. Q.F., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	16·0‡	750†	552
b.	**Württemberg**	I.	7441	321 6	60 0	19 8	2	6000 T. S.	Stettin	1878 1898	402,512	15¾	10	3	6 10·2-in. (Krupp), 8 3·4-in. Q.F., 8 1·4-in., 1 l., 6 M.*	5 (2 sub.)	14·0	700	376

* New armament. † Also liquid fuel. ‡ Wörth: trial, 17·2 knots.

The Arminius, Friedrich Carl, and Kronprinz are now used for harbour service.

GERMANY —Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.			knots.	tons.	
3rd cl. *cr.*	**Alexandrine** . . .	I. S. & W.	2373	236 3	42 7	18 4	1	2400	Kiel . .	1885	102,877	..	..	10 5·9-in., 4 4·1-in., 10 M., 1 l.	1	14·0	..	267
" "	**Amazone (F)** . .	S.	2650	344 6	38 7	16 0	2	5000 T.S.	Kiel (Germania)	1900	167,500	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	2 (sub.)	21·5	550	249
" "	**Arcona** . . .	I. S. & W.	2373	236 3	42 7	18 4	1	2400	Danzig . .	1885	109,875	..	..	10 5·9-in., 4 4·1-in., 10 M., 1 l.	1	14·0	..	267
" "	**Ariadne** . . .	S.	2600	328 0	38 4	16 0	2	8000 T.S.	Bremen (Weser)	1900	167,500	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	2 (sub.)	21·5	550	249
" "	**Blitz**	S.	1382	246 0	32 10	13 5	2	2839	Kiel . .	1882	66,935	..	..	6 3·4-in., 4 M. . . .	1	16·0	250	127
g. b. .	**Bremse** . . .	S.	866	203 5	27 10	10 6	1	1500	Bremen . .	1884	49,308	..	2½	1 8·2-in.	..	15·0	65	73
g. b. .	**Brummer** . . .	S.	866	203 5	27 10	10 6	1	1500	Bremen . .	1884	52,422	..	2½	1 8·2-in.	..	15·0	65	73
3rd cl *cr.*	**Bussard** . . .	S.	1857	256 0	30 2	18 4	2	2900	Danzig . .	1890	..	..	3	8 4·1-in. Q.F., 7 M. . .	2	16·5	400	..
" "	**Falke**	S. & W.	1731	246 0	33 6	15 0	2	2900	Kiel . .	1891	..	..	3	8 4 1-in. Q.F., 7 M. . .	2	15·5	400	..
2nd cl. *cr.*	**Freya**	S.	5650	344 5	57 0	20 8	3	10,000 Nic.	Danzig . .	1897	..	4 N.S.	4 N.S.	2 8·2-in. Q.F., 8 6-in. Q.F., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	20	500†	440
3rd cl. *cr.*	**G. H. J.** . . .	S.	2650	344 6	38 7	16 0	2	(8000) (T.S.)	Kiel (Germania)	Bldg Pro.	167,500	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	2 (sub.)	21·5	550	249
3rd. cl. *cr.*	**Gazelle** . . .	S. & bronze shd.	2650	328 0	38 7	16 9	2	7000 Nic.	Kiel (Germania)	1898	130,000	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	3 (1sub.)	19·0	..	210
2nd "	**Gefion** . . .	S.	4207	344 6	42 8	20 8	2	9000	Danzig (Schichau)	1893	..	..	1¼	10 4 1-in. Q.F., 6 2·1-in., 1 l., 8 M.	2	19·0	950	312
3rd "	**Geier**	S. & W. shd.	177[illegible]	219 4	34 10	15 6	2	2900	Wilhelmshaven	1894	..	..	3	8 4·1-in. Q.F., 7 M. . .	2	16·2	400	130
" "	**Greif**	S.	2000	318	32	14 9	2	5400	Kiel . .	1886	..	..	..	2 3·4-in. Q.F., 4 M. . .	..	19·0	..	
g. v. .	**Habicht** . . .	I. & W.	848	174 0	29 6	11 5	1	600	Elbing . .	1879	33,054	..	..	5 4·9-in., 5 M. . . .	..	12·0	..	128
2nd cl. *cr.*	**Hansa** . . .	S. shd.	5900	345 7	57 10	21 8	3	10,000 B	Stettin (Vulcan)	1898	..	4 N.S.	4 N.S.	2 8·2-in. Q.F., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·0	500	440

GERMANY.—Cruising Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots	tons.	
d.v.	**Hela**	S.	2000	328 0	36 0	..	2	5860	Bremen	1895	..	..	1¼	4 3·4-in. Q.F., 6 1·9-in., 2 M.	3	20·0	347	169
2nd cl. *cr.*	**Hertha**	S.	5650	344 6	57 0	21 8	3	10,000 B	Stettin (Vulcan)	1897	..	4	4 N.S.	2 8 2-in. Q.F., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	20·0	500†	440
g. b.	**Iltis**	S. (shd.)	895	203 6	29 10	10 8	2	1300	Danzig (Schichau)	1898	100,000	..	..	8 3·4-in. Q.F., 6 1·4-in., 2 M.	..	13·5	160	121
2nd cl. *cr.*	**Irene**	S.	4400	308 0	46 0	21 0	2	8000	Stettin	1887	220,000	..	3	4 5·9-in., 8 4·1-in. Q.F., 6 1 9-in., 1 l., 8 M.	4	19·8	900	358
to. g. b.	**Jagd**	S.	1250	275 6	31 6	13 9	2	4000	Bremen	1888	..	..	2	4 3·4-in. Q.F., 2 M.	3	20·0	..	126
g. b.	**Jaguar**	S. (shd.)	895	203 6	29 10	10 8	2	1300	Danzig (Schichau)	1898	100,000	..	..	8 3·4-in. Q.F., 6 1·4-in., 2 M.	..	13·5	160	..
1st cl. *cr.*	**Kaiserin Augusta**	S. (shd.)	6331	387 0	52 6	23 0	3	14,000	Kiel (Germania)	1892	..	..	3½	12 5·9-in., 8 3·4-in. Q.F., 2 l., 8 M.	5	21·0	800	427
to. g. b.	**Komet**	S.	946	262 6	31 2	13 9	2	5000	Stettin	1892	..	..	2	4 3·4-in. Q.F., 2 M.	1	21·0 (*t*)	..	90
3rd cl. *cr.*	**Kondor**	S. & W.	1640	246 0	33 6	15 0	2	2930	Hamburg	1892	..	..	3	8 4·1-in. Q.F., 7 M.	2	16·5	400	..
3rd cl. *cr.*	**Kormoran**	S. & W.	1640	246 0	33 6	15 0	2	2930	Danzig	1892	..	..	3	8 4·1-in. Q.F., 7 M.	2	16·0	400	..
g. b.	**Luchs**	S.	894	203 6	29 10	10 8	2	1300	Danzig	Bldg.	..	..	..	8 3·4-in. Q.F., 6 1·4-in., 2 M.	..	13·5	160	..
3rd cl. *cr.*	**Medusa**	S.	2600	328 0	38 4	16 0	2	8000 T.S.	Bremen (Weser)	1900	167,500	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	2 (sub.)	21·5	550	249
d. v.	**Meteor**	S.	946	262 6	29 6	11 6	2	4500	Gaarden	1890	..	..	2	2 3·4-in. Q.F., 2 M.	3	21·0	..	90
3rd cl. *cr.*	**Niobe**	S. (shd.)	2600	328 0	38 7	15 1	2	8000 T.	Bremen (Weser)	1899	167,500	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	2 (1sub.)	21·5	..	250
cr.	**Nixe §**	I. & W.	1760	177 2	42 8	18 0	1	700	Danzig	1885	..	..	..	8 5·9-in.	..	10·5	..	116
3rd cl. *cr.*	**Nymphe**	S.	2600	328 0	38 7	15 1	2	8000 T.S.	Kiel (Germania)	1899	167,500	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	2 (1sub.)	21·5	550	210
cr.	**Olga**	I. & W.	2100	226 4	42 7	18 4	1	2100	Stettin	1880	113,812	..	..	8 5·9-in., 2 3·4-in. Q.F., 1 l., 6 M.	..	14·0	320	267

cr.	Pelikan† (mining ship)	S.	2360	259	0	38	0	14	5	2	3000	Kiel	1890	..	..	..	4 3·4-in. Q.F., 4 M.	..	15·4	370	183
3rd cl. cr.	Pfeil	S.	1382	246	0	32	10	13	5	2	2700	Wilhelmshaven	1882	73,605	..	..	4 3·4-in. Q.F., 4 M.	1	16·0	250	127
2nd cl. cr.	Prinzess Wilhelm	S.	4400	339	6	46	0	21	0	2	8000	Gaarden	1887	220,000	..	3	4 5·9-in., 8 4·1-in. Q.F., 6 1·9-in., 1 l., 8 M.	4	18·7	900	358
3rd cl. cr.	Schwalbe	S. & W.	1120	203	0	30	6	12	4	2	1500	Wilhelmshaven	1887	..	..	3	8 4·1-in. Krupp, 7 M.	..	13·5	300	150
,, ,,	Seeadler	S. & W.	1640	246	0	33	6	15	0	2	2800	Hamburg	1892	..	..	3	8 4·1-in., 7 M.	2	16·0	400	156
,, ,,	Sophie	I. & W.	2100	226	4	42	7	18	4	1	2100	Danzig	1892	117,155	..	..	8 5·9-in., 2 3·4-in. Q.F., 1 l., 6 M.	..	14·0	320	267
,, ,,	Sperber	S. & W.	1120	236	0	29	8	12	6	2	1500	Wilhelmshaven	1888	..	..	3	8 4·1-in., 6 M.	..	13·5	300	150
,, ,,	Thetis	S.	2650	344	6	38	7	16	0	2	5000 T.S.	Danzig	1900	167,500	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	2 (sub.)	21·5	550	249
g. b.	Tiger	S.	894	203	6	29	10	10	8	2	1300	Danzig	1899	..	..	..	8 3·4-in. Q.F., 6 1·4-in., 2 M.	..	13·5	160	..
g. b.	"A."											Danzig	Bldg.								
2nd cl. cr.	Victoria Luise	S.	5650	344	5	57	0	21	8	3	10,000 Dürr.	Bremen	1897	..	4 H.S.	4 H.S.	2 8·2-in. Q.F., 8 6-in. Q.F., 10 3·4-in., 10 1·4-in., 4 M.	3 sub.	19·1	500	440
,, ,,	Vineta	S. shd.	5900	345	7	57	10	21	8	3	10,000 Dürr.	Danzig							18·0	500	440
3rd cl. cr.	Wacht	S.	1250	262	0	31	6	13	9	2	4000	Bremen	1887	..	..	2	4 3·4-in. Q.F., 2 M.	3	19·6	230	126
d. v.	Zieten	I.	975	196	10	29	6	11	6	1	2323	Blackwall	1876	81,755	..	..	4 1·9-in. Q.F., 6 M.	..	16·0	140	111

The Charlotte, Marie, Mars, Grille, Hay, Ulan, Moltke, Stein and Stosch, in addition to others given in the list, are used as schoolships. The Gneisenau, training ship, was lost at Malaga, December 16, 1900. The Blücher (2856 tons), built at Kiel in 1877, is the torpedo training ship, and the Carola (2169 tons), built at Stettin in 1880, the gunnery ship.

The Imperial Yacht Hohenzollern, 4187 tons, 9460 I.H.P., 22 knots, carries 8 1·9-in. Q.F., but provision is made for mounting 3 4·1-in., 12 1·9-in. Q.F. and 4 M.

The station vessel for Constantinople is named the Loreley.

Storeships—Möwe, Wolf, Hyäne.

† Displacement with 950 tons of coal, 6100 tons. Provision made for liquid fuel.

§ Training Ship.

Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Displacement.	Length.		Beam.		Draught of Water.		Indicated H.P.	Ocean Speed.	When Built.	Armament of each Ship.
		tons.	ft.	in.	ft.	in.	ft.	in.		knots.		
Hamburg-American S.S. Co.	Fürst Bismarck	10,500	502	0	57	6	22	3	16,400	19½	1891	8 5·9-in., 4 4·7-in., 2 3·4-in. Q.F., 2 2·2-in., 14 M.
	Augusta Victoria	9,500	459	3	56	0	23	0	12,280	18	1889	
	Deutschland	23,000	682	6	67	0	..		33,000		1900	
North German Lloyd	Spree	8,900	462	6	51	10	22	0	12,770	19	1890	
	Lahn	7,700	449	6	49	0	22	0	9,500	18½	1887	
	Kaiser Wilhelm der Grosse	20,000	625	0	66	0	27	0	27,000	22	1897	Not known.
	Kaiser Friedrich III.	17,000	580	9	63	11	..		25,000	22	1897	
	Aller	4,965	436	6	48	0	..		1,300(a)	16	1885	
	Saale	4,965	436	6	48	0	..		1,300(a)	16	1886	
	Trave	4,965	436	6	48	0	..		1,300(a)	16	1886	

For the transport of troops to China the following vessels of the North German Lloyd were employed: the Aachen, Crefeld, Darmstadt, Dresden, Frankfurt, Gera, Halle, Hannover, Meier, Köln, Rhein, Roland, Strassburg, and Wittekind; and of the Hamburg-American line, the Adria, Andalusia, Arcadia, Batavia, Palatia, Phönicia, Sardinia, and Valdivia.

(a) Nominal horse-power.

GREECE.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
															Belt.	Battery.	Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.					inches.	inches.	ins.			knots.	tons.	
c.d.s.	**Basileos Georgios**	I.	1774	200	2	36	0	15	6	2	2100	Blackwall	1867	..	7	6	9	2 6·6-in. (Krupp), 1 5·9-in. 9 M.	1	12 0	210	120
br.	**Basilissa Olga*** .	W.	2030	230	0	59	0	18	0	1	1950	San Rocco	1869	..	6	4½	..	4 6·6-in. 5½-ton (Krupp), 2 6·6-in. 3½-ton, 4 M., 4 l. .	3	10·0	240	400
b.	**Hydra** . .	S.	4885	334	6	51	10	23	3	2	7000	St. Nazaire La Seyne .	1889 1900	..	11¾	13½	2½	3 10·6-in. Canet, 5 5·9-in., 1 3·9-in., 8 2·5-in., 4 1·8-in., 12 1·4-in.	3	17·0	600	400
b.	**Psara** . . .	S.	4885	334	6	51	10	23	3	2	7000	Havre . . La Seyne .	1890 1897	..	11¾	13½	2½	3 10·6-in. Canet, 5 5·9-in., 1 3·9-in., 8 2·5-in., 4 1·8-in., 12 1·4-in.	3	17·0	600	400
b.	**Spetsai** . .	S.	4885	334	6	51	10	23	3	2	7000	Havre . . La Seyne .	1889 1900	..	11¾	13½	2½	3 10·6-in. Canet, 5 5·9-in., 1 3·9-in., 8 2·5-in., 4 1·8-in., 12 1·4-in.	3	17 0	600	400

* Has received two fighting masts and new machinery; similar changes in the Georgios.

GREECE.—Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			Metric tons.	ft.	in.	ft.	in.	ft.	in.	no.									knots.	tons.	
g.v.	Acheloos . .	S.	420	130	0	24	6	11	6	1	400	Blackwall	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·0	50	..
g.v.	Alphios . . .	S.	420	130	0	24	6	11	6	1	400	Blackwall	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·0	50	..
g.v.	Aphroessa . .	I.	380	124	7	22	11	9	10	1	160	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp) .	..	9·0	30	..
g.v.	Eurotas . . .	S.	420	130	0	24	6	11	6	1	400	Dumbarton	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·0	50	..
corv.	Hellas (training) .	W.	1654	200	2	37	0	19	4	1	1500	Northfleet	1858 rep. 1878–90	..	..	..	6 5·9-in. (Krupp), 2 M. .	..	11·0	230	..
cr.	Mykale (transport) .	S.	1000	210	6	32	6	18	0	2	2400	Glasgow	1880	..	..	..	2 M.	..	1·4	..	..
corv.	Nauarchos Miaulis	I. & W.	1800	246	0	36	0	14	5	1	2200	La Seyne	1879	..	..	..	3 6·6-in., 5½-ton (Krupp), 1 6·6-in. 3½-ton do., 2 M., 4 l.	..	15·0	220	250
g.v.	Paralos . . .	I.	380	123	0	23	11	9	10	1	204	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp), 1 M. .	..	8·0	60	..
g.v.	Pinios . . .	S.	420	130	0	24	6	12	6	1	400	Dumbarton	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·55	50	..
g.v.	Plixaura . .	I.	380	124	7	22	11	9	10	1	160	Pt. Glasgow	1856	..	..	..	1 3·4-in. (Krupp) . .	..	9·0	55	..
g.v.	Salaminia . .	I.	380	123	0	23	11	9	10	1	200	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp), 1 M. .	..	8·0	60	..
corv.	Sfaktirea . .	S.	1000	216	6	29	3	18	0	1	2400	England	1885	..	..	..	2 3·9-in. (Krupp), 2 M. .	..	14·5	100	..
g.v.	Syros . . .	I.	380	124	7	22	11	9	10	1	160	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp) . .	..	9·0	18	100

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 2 Whitehead torpedo-launching guns on broadside, 2 under-water torpedo tubes ahead; 14 knots speed.

There are also 2 gunboats, Ambrakia and Aktion, of 440 tons displacement, 380 horse-power, 10 knots speed, fitted with 1 10·2-in. Krupp gun and 2 machine guns; launched 1885; 4 gunboats, A. β. Γ. Δ. (52 tons, 1 4·7-in. Krupp), launched 1881; and 3 mining vessels (300 tons), launched 1881.

ITALY.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			Metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	ins.			knots.	tons.	
t.	**Affondatore** . .	I.	4062	290	0	40	0	20	0	1	3240	Millwall .	1865	197,600	5	5	2	2 28-ton (Armstrong), 6 4·7-in. Q.F., 2 2·9-in., 4 2·2-in., 4 1·4-in., 2 M.	2	12·0	460	303
"	**Ammiraglio di St. Bon**	S.	9800	344	6	69	4	24	9	2	13,500	Venice .	1897	..	9¾–4 H.S.	9¾ H.S.	3–1½	4 10-in., 8 6-in. Q.F., 8 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	4	18·0	600	548
a.c.	**Ancona** . . .	I.	4460	256	0	50	0	25	0	1	2548	Bordeaux	1864	172,000	4½	4½	..	6 6-in. Q.F., 6 4·7-in., 2 2·9-in., 8 2·2-in., 12 1 4-in., 2 M.	3	12·0	485	423
b.	**Andrea Doria** . .	S.	11,000	328	2	65	4	27	2	2	10,500	Spezia .	1885	765,500	18 *comp.*	18 *comp.*	3	4 105-ton (Armstrong), 2 6-in. 4 4·7-in. Q.F., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2 sub.)	16·1	850	526
b.	**Benedetto Brin** .	S.	13,427	426	6	78	2	27	4	2	19,000 B.	Castellamare	Bldg.	..	6 H.S.	8 H.S.	3	4 12-in., 12 6-in. Q.F., 4 8-in., 18 3-in., 8 1·8-in., 4 M.	4 (sub.)	20·0	1000	700
a.c.	**Carlo Alberto** . .	S.	6500	325	0	59	0	22	11	2	13,220 (*t*)	Spezia .	1896	..	6 H.S.	6 H.S.	1½	12 6-in. Q.F., 6 4·7-in., 2 2·9-in., 10 2·2-in., 10 1·4-in., 2 M.	4	19·2 (*t*)	1000	500
a.c.	**Castelfidardo** . .	I.	4250	256	0	50	0	21	11	1	3070	St. Nazaire	1863	233,000	4½	4½	1¾	6 6-in. Q.F., 6 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	3	12·0	485	423
t.	**Dandolo** * . . .	I & S	11,202	340	11	64	9	26	7	2	8045	Spezia .	1878 1898	872,640	21½	18	2	4 10-in. (Armstrong), 7 6-in. Q.F., 5 4·7-in., 2 2·9-in., 10 2·2-in., 14 1·4-in., 2 M.	4	15·6	732	506
t.	**Duilio** . . .	I & S	11,138	340	11	64	9	26	7	2	7710	Castellamare	1876	850,400	21½	18	2	4 100-ton M.L.R. (Armstrong), 3 4·7-in. Q.F., 2 2·9-in., 8 2·2-in., 22 1·4-in., 2 M.	3	15·0	1000	487
t.	**Emanuele Filiberto** .	S.	9800	344	6	69	4	24	9	2	13,500	Castellamare	1897	..	9¾–4 H.S.	9¾ H.S.	3–1	4 10-in., 8 6-in. Q.F., 8 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	4	18·0	600	536
b.	**Francesco Morosini**	S.	11,000	328	2	65	4	27	2	2	9560	Venice .	1885	770,680	18 *comp.*	18 *comp.*	3	4 105-ton (Armstrong), 2 6-in., 4 4·7-in. Q.F., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2 sub.)	17·0	850	509
a.c.	**Francesco Ferrucio** .	S.	7350	344	0	59	9	23	4	2	13,500 Nic.	Venice .	Bldg.	..	6 H.S.	6 H.S.	1½	1 10-in., 2 8-in. Q.F., 14 6-in., 10 2·9-in., 6 1·8-in., 2 M.	4 (sub.)	20·0	655	540
a.c.	**Giuseppe Garibaldi**		7410								14,713 (*t*) Nic.	Sestri-Ponente (Ansaldo)	1899								1200	

* New armament given. The reconstruction of the Duilio is not likely to be proceeded with.

ITALY.—Armoured Ships—*continued*.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.	inches.			knots.	tons.	
b.	**Italia***	S.	14,387	400 6	74 0	31 2	2	11,986 (*t*)	Castellamare	1880	1,167,680	16 funnel op'nings	19 *comp.*	3	4 100-ton (Armstrong), 8 6-in., 4 4·7-in. Q.F., 12 2·2-in., 24 1·4-in., 2 M.	4	18·0	1200	748
b.	**Lepanto**	S.	14,400	400 6	74 0	31 2	2	15,800 (*t*)	Leghorn (Orlando)	1883	1,150,880	16 funnel op'nings	19 *comp.*	3	4 100-ton (Armstrong), 8 6-in., 4 4·7-in. Q.F., 12 2.2-in., 34 1·4-in., 2 M.	4	18·38	1650	748
a.c.	**Marco Polo**	S.	4583	327 0	48 3	19 6	2	10,543 (*t*)	Castellamare	1890	344,400	4	4	1	6 5·9-in. Q.F., 10 4·7-in., 2 2·9-in., 9 2·2-in., 4 1·4-in., 2 M.	5 (1 sub.)	19·0	600	391
a.c.	**Maria Pia**	I.	4268	256 0	49 4	22 7	1	2243	La Seyne	1863	215,000	4½	4½	..	8 5·9-in., 6 4·7-in. Q.F., 2 2·9-in. 10 2·2-in. 10 1·4-in., 2 M.	3	12·0	485	423
b.	**Regina Elena**	S.	12,624	435 0	73 6	25 7	2	20,000	Spezia	Bldg.	1,000,000	9¾ H.S.	9¾ H.S.	2	2 12-in., 12 8-in., 12 3-in. Q.F., 12 1·8-in.	4	22·0	1000 / 2000	..
b.	**Regina Margherita**	S.	13,427	426 6	78 2	27 4	2	19,000 Nic.	Spezia	1901	..	6 H.S.	8 H.S.	3	4 12-in., 4 8-in., 12 6-in. Q.F., 18 3-in., 8 1·8-in., 4 M.	4 (sub.)	20·0	1000	700
b.	**Re Umberto**	S.	13,825	400 0	76 9	28 6	2	19,500	Castellamare	1888	1,058,500	4	18	3	4 67-ton (Armstrong), 8 6-in. Q.F., 16 4·7-in., 2 9-in., 15 2·2-in., 14 1·4-in., 2 M.	8	19·0	1200	785
b.	**Ruggiero di Lauria**	S.	11,000	328 2	65 4	27 2	2	10,600	Castellamare	1884	777,560	18 *comp.*	18 *comp.*	3	4 105-ton (Armstrong), 2 6-in. 4 4 7-in. Q.F., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2 sub.)	17·0	910	509
a.c.	**San Martino** (training service)	I.	4268	256 0	49 4	22 7	1	2620	La Seyne	1863	213,880	4½	4½	..	8 5·9-in., 6 4·7-in. Q.F., 2 2·9-in., 10 2·2-in., 10 1·4-in., 2 M.	3	12·0	490	423
b.	**Sardegna**	S.	13,860	411 0	76 9	28 6	2	19,650 (*t*)	Spezia	1890	1,057,440	4	14¼ *comp.*	3	4 67-ton (Armstrong), 8 5·9-in. Q.F., 16 4·7-in., 2 2·9-in., 20 2·2-in., 10 1·4-in., 2 M.	5	20·1 (*t*)	1200	785
"	**Sicilia**	S.	13,375	400 0	76 9	28 6	2	19,500	Venice	1891	1,050,000	4	18 *comp.*	3	4 67-ton (Armstrong), 8 5·9-in. Q.F., 16 4·7-in., 2 2·9-in., 20 2·2-in., 10 1·4 in., 2 M.	5	19·2	1200	785
a.c.	**Varese**	S.	7400	344 6	59 9	23 9	2	13,500 B	Leghorn (Orlando)	1899	..	6 H.S.	6 H.S.	1½	1 10-in., 2 8-in. Q.F., 14 6-in., 10 2·9-in., 6 1·8-in., 2 M.	4	20·0	650 / 1200	500
b.	**Vittorio Emanuele III.**	S.	12,624	435 0	73 6	25 7	2	20,000	Castellamare	Bldg.	1,000,000	9¾ H.S.	9¾ H.S.	4	2 12-in., 12 8-in., 12 3-in. Q.F., 12 1·8-in.	4	22·0	1000 / 2000	..
a.c.	**Vettor Pisani**	S.	6500	325 0	59 0	22 11	2	13,000	Castellamare	1895	..	6 H.S.	6 H.S.	1½	12 6-in. Q.F., 6 4·7-in., 2 2·9-in. 10 2·2-in., 10 1·4-in., 2 M.	5	20·0	600	504

Note.—The Palestro, Principe Amedeo, and Roma are non-effective, or only available for coast defence.

* The Italia is at present dismantled, and is to be reconstructed.

ITALY.—Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armaments.		Speed	Normal Coal Supply.	Comp'ement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
to.cr	**Agordat**	S.	1313	287	6	30	6	11	1	2	8000	Castellamare	1899	..	..	1	4 4·7-in. Q.F., 8 2·2-in., 2 1·4-in.	2	23·0	160	158
3rd cl. *cr.*	**Amerigo Vespucci** (training)	S.	2795	255	11	42	7	17	0	1	3340	Venice	1882	176,300	..	¾	4 4·7-in., 1 3-in., 4 2·2-in., 4 1·4-in., 4 M.	2	14·0	500	265
g.v.	**Andrea Provana**	S.	733	167	4	26	3	10	2	1	1080	Leghorn (Orlando)	1884	39,760	..	..	4 4·7 in., 3 1·4-in., Q.F.	..	13·0	120	103
d.v.	**Archimede**	S.	784	230	0	26	3	10	0	1	1401	Venice	1887	60,120	..	..	4 4·7-in., 2 2·2-in. Q.F., 2 1·4-in.	2	16·0	210	109
to.g.b.	**Aretusa**	S.	846	230	0	26	10	11	9	2	4420	Leghorn (Orlando)	1891	72,920	..	1	1 4·7-in., 6 2·2-in., and 3 1·4-in.	6	20·7	120	111
3rd cl. *cr.*	**Calabria**	S.	2442	249	4	42	0	16	7	2	4094 *t.*	Spezia	1894	183,120	..	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	2	16·4 *t.*	500	257
to.g.b.	**Calatafimi**	S.	840	229	6	27	0	10	2	2	4136	Castellamare	1893	72,920	..	1	1 4.7-in. Q.F., 6 2·2-in., 3 1·4-in.	6	20·0	120	111
,,	**Caprera**	S.	853	230	0	27	4	10	2	2	4189	Leghorn (Orlando)	1894	72,920	..	1	2 4·7-in. Q.F., 4 2·2-in., 2 1·4-in. Q.F.	5	21·0	120	111
g.v.	**Cariddi**	W.	1050	177	2	28	6	12	5	1	844	Castellamare	1875	65,480	..	..	2 4·7-in., 4 2·2-in. Q.F.	..	10·0	140	112
to.cr.	**Coatit**	S.	1313	287	6	30	6	11	1	2	8000	Castellamare	1899	..	..	1	4 4·7-in. Q.F., 8 2·2-in., 2 1·4-in.	2	23·0	160	158
to.g.b.	**Confienza**	S.	768	230	0	25	6	9	0	2	1887	Spezia	1887	61,480	..	1	1 4·7-in. Q.F., 6 2·2-in., 2 1·4-in.	4	17·0	180	111

ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Cristoforo Colombo .	S.	2757	249 0	36 0	17 6	..	2321	Venice . .	1892 Rebit	157,240	..	..	6 4·7-in., 2 2·2-in., Q.F., 4 1·4-in.	..	16·0	445	238
g.v .	Curtatone . . .	S.	1292	177 3	32 8	13 6	1	1100	Venice . .	1887	58,440	..	..	4 2·2-in., 2 1·4-in., 2 M.	..	12·0	197	131
3rd cl. *cr.*	Dogali . . .	S.	2088	250 0	37 0	14 6	2	7600	Elswick . .	1887	156,040	4½	2	6 6-in. (Armstrong), 1 2·9-in., 9 2·2-in. Q.F., 2 1·4-in., 2 M.	4	19·66	480	257
,,	Elba	S.	2730	272 6	40 8	16 7	2	7471 (*t*)	Castellamare .	1893	200,000	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	2	17·9*t*	500	272
2nd cl. *cr.*	Etna	S.	3530	282 2	42 7	19 0	2	6169	Castellamare .	1885	226,720	5	1½	2 9·8-in. (Armstrong), 6 5·9-in., 1 2·9-in., 5 2·2-in. Q.F., 8 1·4-in., 2 M.	4	17·8	630	315
to.g.b. .	Euridice . . .	S.	840	229 6	27 0	10 2	2	4162	Castellamare .	1891	72,920	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	6	19·8*t*	120	111
3rd cl. *cr.*	Etruria . . .	S.	2280	262 6	39 6	16 7	2	7585 (*t*)	Leghorn (Orlando)	1891	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 10 1·4-in., 2 M.	2	19·84	400	257
2nd cl. *cr.*	Fieramosca . .	S.	3600	290 0	43 6	19 4	2	7700	Leghorn (Orlando)	1888	240,120	5	1½	2 9·8-in., 6 6-in. Q.F., 1 2·9-in., 5 2·2-in., 8 1·4-in., 2 M.	4	17·5	450	315
cr. . .	Flavio Gioja (training)	S.	3064	255 11	42 7	17 0	1	4150	Castellamare .	1881	193,920	..	1½	4 4·7-in., 1 3-in., 4 2·2-in. Q.F., 4 1·4-in., 4 M.	2	15·0	500	265
d.v. .	Galilei . . .	S.	900	230 0	26 3	8 2	1	1384	Venice . .	1887	56,720	..	..	4 4·7-in., 2 2·2-in. Q.F., 2 1·4-in.	2	15·0	210	109

3rd cl. *cr.*	**Giovanni Bausan**	S.	3068	275	7	42	7	18	4	2	6500	Elswick	1883	179,120	5	1½	2 9·8-in. (Armstrong), 6 5·9-in., 1 2·9-in., 4 2·2-in. Q.F., 8 1·4-in., 2 M.	3 (1 sub.)	17·5	600	295
to.g.b.	**Goito**	S.	812	230	0	25	6	11	9	2	2620	Castellamare	1887	70,680	..	1	4 2·2-in. Q.F., 5 1·4-in.	5	19·0	130	111
g.v.	**Governolo**	S.	1255	185	0	33	9	13	9	1	1100	Venice	1894	58,440	..	..	4 4·7-in. Q.F., 4 2·2-in., 2 1·4-in., 2 M.	..	13·0	200	131
to.g.b.	**Iride**	S.	840	229	6	27	0	10	2	2	4242	Castellamare	1891	72,920	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	6	19·6	120	111
3rd cl. *cr.*	**Liguria**	S.	2280	262	6	39	4	16	9	2	7677 (*t*)	Sestri (Ansaldo)	1893	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 10 1·4-in., 2 M. (2 Maxims).	2	19·6*t*	430	257
„ „	**Lombardia**	S.	2380	262	6	39	6	16	7	2	6843 (*t*)	Castellamare	1890	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	2	17·0*t*	430	257
d.v.	Marcantonio Colonna	S.	656	216	6	23	11	10	10	1	1700	..	1879	51,480	..	..	5 2·2-in. Q.F., 2 M.	..	15·4	197	82
to.g.b.	**Minerva**	S.	846	246	0	27	6	11	9	2	4800 W.T.	Sestri (Ansaldo)	1892	72,720	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	5	21·0	120	111
„	**Montebello**	S.	814	230	0	25	6	11	9	3	2776	Spezia	1888	74,120	..	1	6 2·2-in. Q.F., 2 1·4-in.	4	19·0	100	111
„	**Monzambano**	S.	840	230	0	25	6	11	9	3	1953	Spezia	1888	70,680	..	1	6 2·2-in. Q.F., 2 1·4-in.	4	17·0	100	111
„	**Partenope**	S.	840	246	0	27	6	11	9	2	4200	Castellamare	1890	71,000	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	5	19 0	100	111
3rd cl. *cr.*	**Piemonte**	S.	2500	300	0	38	0	15	0		12,000	Elswick	1888	220,000	3	3	6 6·6-in. Q.F., 6 4·7-in., 10 2·2-in., 6 1·4-in., 4 M.	3	21·0	560	325
3rd cl. *cr.*	**Puglia**	S.	2550	269	0	41	0	16	9	2	7000	Taranto	1898	200,000	4½	1	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	2	20·0	650	257
d.v.	**Rapido**	I.	1568	262	5	30	6	12	6	1	1450	Leghorn (Orlando)	1876	77,400	..	..	5 2·2 in. Q.F., 2 M.	1	13·4	300	135
to.g.b.	**Saetta**	S.	400	187	0	19	8	6	7	2	2400	Castellamare	1887	38,880	..	..	2 2·2-in. Q.F., 4 1·4-in.	3	20·0	90	70

ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
cr.	**Savoia**	S.	2850	275	6	42	7	17	0	1	3340	Castellamare	1883	176,160	..	1·5	4 2·2-in. Q.F.	2	14·0	600	216
g.v.	**Scilla**	W.	1076	177	2	28	6	12	5	1	826	Castellamare	1874	65,520	..	..	4 2·2-in. Q.F., 2 M.	..	10·0	140	111
g.b	**Sebastiano Veniero**	S.	713	170	0	26	3	10	6	1	1160	Leghorn (Orlando)	1884	36,160	..	..	4 4·7-in., 3 1·4-in. Q.F.	..	13·0	150	103
d.v.	**Staffetta**	I.	1806	252	7	30	10	13	2	1	1800	S. Pierdarena (Ansaldo)	1876	82,600	..	..	4 4·7-in., 2 1·4-in. Q.F.	1	13·5	300	135
2nd cl. *cr.*	**Stromboli**	S.	3475	282	2	42	7	19	0	2	6298	Venice	1886	220,080	5	1·5	2 9·8-in. (Armstrong), 6 5 9-in., 1 2·9-in., 5 2·2-in. Q.F., 8 1·4-in., 2 M.	4	17·0	600	315
to. g.b.	**Tripoli**	S.	848	230	0	25	10	11	9	3	2543	Castellamare	1886	72,080	..	1	7 2·2-in.	4	18·0	130	107
3rd cl. *cr.*	**Umbria**	S.	2280	262	6	39	6	16	7	2	7104 (*t*)	Leghorn (Orlando)	1891	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in., 8 2·2-in., 10 1·4-in., 1 l., 2 M.	2	18·83 (*t*)	430	257
to. g.b.	**Urania**	S.	846	230	0	27	0	11	2	2	4397	Sestri (Odero)	1891	72,920	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	6	20·0	120	111
d.v.	**Vedetta**	I.	827	183	9	26	11	11	5	1	466	Genoa	1866	32,400	..	..	4 4·7-in., 2 1·4-in. Q.F.	..	11·0	137	85
2nd cl. *cr.*	**Vesuvio**	S.	3427	282	2	42	7	19	0	2	6820	Leghorn (Orlando)	1886	218,320	5	1·5	2 9·8-in., 6 5·9-in., 1 2·9-in., 5 2·2-in. Q.F., 8 1·4-in., 2 M.	4	17·0	600	315
g.v.	**Volturno**	S.	1174	177	3	32	8	14	4	1	1100	Venice	1887	58,960	..	..	4 4·7-in., 4 2·2-in. Q.F., 2 1·4-in., 2 M.	..	13·0	206	131

Subsidised auxiliary cruisers and despatch vessels.—Nord America, Vittoria, Duca de Galliera, and Duchessa di Genova (La Veloce S.S. Co.), Regina Margherita, Elettrico, Candia, Malta, Perseo and Orione (Navigazione Generale). The armament of these vessels is 2 2·2-in. Q.F., and 4 1·4-in. M. The gun vessels Castore and Polluce (530 tons) have been converted into tank-ships, and their guns landed and placed in the forts at Taranto.

JAPAN.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.†	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.	inches.			knots.	tons.	
t.	Asahi	S.	15,200	400 0	75 2	27 3	2	15,000 B	Clydebank	1899	..	9–4 H. S.	14–10 H. S.	4–2½	4 12-in., 14 6-in. Q.F., 20 12-pr., 8 3-pr., 4 2½-pr.	4 (sub.)	18	1400	..
a.c.	Asama	S.	9750	408 0	67 0	24 § 3	2	19,000 t	Elswick	1898	..	7–3½ H. S.	6	2	4 8-in. Q.F., 14 6-in. (Armstrong), 12 12-pr., 7 2½-pr.	5 (4 sub.)	22·1 t	600 / 1200	..
a.c.	Azuma	S.	9436	445 10	59 6	28 0	2	17,000 B	St. Nazaire	1899	..	6	..	3	4 8-in., 12 6-in. Q.F., 12 3-in., 12 1·8-in.	5 (4 sub.)	..	..	482
b.	Chin-Yen (Ex. Chen Yuen)	S.	7400	308 5	59 0	20 0	2	6200	Stettin	1882	..	14	12	3	4 12-in. (Krupp), 4 6-in. Q.F., 8 l., 8 M.	3	14	1000	250
a.c.	Chiyoda	S.	2450	308 0	42 6	14 0	2	5700 B	Clydebank	1889	..	4½	..	1–2	10 4·7-in. Q.F., 14 3-pr., 3 M.	3	17·5	420	300
b.	Fuji	S.	12,320	374 0	73 0	26 6	2	14,000	Thames	1896	..	18—6 H. S.	14 H. S.	2½ H. S.	4 12-in., 10 6-in. Q.F., 20 3-pr., 4 4½-pr.	5 (4 sub.)	19·2 18·5 t	1100	600
b.	Hatsuse	S.	15,000	400 0	76 6	27 0	2	16,300 B	Elswick	1899	..	9–4 H. N. S.	14–6 H N. S	4	4 12-in., 14 6-in. Q.F., 20 12-pr., 8 3-pr., 4 2½-pr.	4 (sub.)	19·11 t	1100 / 1400	741
c.d.s.	Hei-Yen (Ex. Ping-Yuen-Go)	S.	2000	200 0	40 0	16 0	2	2400	Foo Chow	1890	..	8	5	2	1 10·2-in. (Krupp), 2 5·9-in., 6 M.	4	11·0	350	250
a.c.	Hi-yei *	C.	2200	231 0	40 9	17 4	1	2490	Milford	1878	..	4½	..	..	3 6·6-in. (Krupp), 6 5·9-in., 4 M., 1 l.	..	13·0	280	308
a.c. / a.c.	Idzumo / Iwate	S.	9750	400 0	68 6	24 § 3	2	17,300 B	Elswick	1899 / 1900	..	7–3½ H. N. S.	6 H. N. S.	2½	4 8-in. Q.F., 14 6-in., 12 12-pr., 8 2½-pr.	4 (sub.)	20·0	700 / 1600	672
„	Kon-go *	C.	2200	231 0	40 9	17 4	1	2450	Hull	1877	..	4½	..	..	3 6·6-in. (Krupp), 6 5·9-in., 4 M., 1 l.	..	13·7	280	308
b.	Mikasa	S.	15,200	400 0	76 0	27 3	2	15,000 B	Barrow	1900	..	9–6 H. N. S.	14–6 H. N. S.	3	4 12-in., 14 6-in. Q.F., 20 12-pr., 8 3-pr., 4 2½-pr.	(4 sub.)	18·0	700 / 1400	935
b.	Shikishima	S.	14,850	400 0	75 6	27 § 3	2	14,500 B	Thames	1898	..	9–4 H. N. S.	14–6	3–5	4 12-in., 14 6-in. Q.F., 20 12-pr., 8 M.	5 (4 sub.)	18·5	700	741
a.c.	Tokiwa	S.	9750	408 0	67 0	24 § 3	2	20,000	Elswick	1898	..	7–3½ H. S.	6 H. S.	2	4 8-in. Q.F., 14 6-in. (Armstrong), 12 12-pr., 7 2½-pr.	5 (4 sub.)	23·0	600 / 1200	500
a.c.	Yakumo	S.	9850	407 9	64 4	23 9	2	16,000 B	Stettin	1899	..	7–3½ H. S.	6 H. S.	2½	4 8-in. (Armstrong) Q.F., 12 6-in., 12 12-pr. (Armstrong), 7 2½-pr.	5 (4 sub.)	20·0	600 (1100)	500
b.	Yashima	S.	12,320	374 0	73 0	26 6	2	14,000	Elswick	1896	..	18–6 N. S.	14 N. S.	2½	4 12-in., 10 6-in. Q.F., 20 3-pr., 4 4½-pr.	5 (4 sub.)	19·2 18·5 t	1100	600

* These are now used as training ships; they have no armour as against end-on fire, and no armoured deck; also the older Riojo (2459 tons)—gunnery—now without engines.

† All Q.F. guns and 12-in. for new ships are Armstrong. § Mean draught.

The old central battery ironclad *Fu-So* (3718 tons) built on the Thames, 1877, and sunk off Shikoku Island, 1897, has been refloated, and is being repaired at Kure dockyard.

JAPAN.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
g.v.	Akagi	S.	615	164 0	27 0	10 0	1	700	Japan	1889	..	..	..	1 8·2-in., 1 5·9-in., 2 l., 2 M.	..	13·0	..	113
cr.	Akashi	S.	2700	306 9	40 0	16 4	2	8500	Japan (Yokosuka)	1895	327,000	..	2–1	2 6-in. Q.F. (Armstrong), 6 4·7-in., 12 3-pr., 4 M.	2	20·0	200	..
"	Akitsushima	S.	3150	302 0	42 7	18 5	2	8400	Japan	1892	..	4½	3	4 6-in. Q.F., 6 4·7-in., 10 3-pr.	4	19·0	..	330
g.v.	Atago	S.	615	154 0	27 0	10 6	2	700	Japan	1887	..	..	..	1 8·2-in., 1 4·7-in., 2 M.	..	12 0	60	113
t.g b.	Chihaya	S.	875	240 0	27 6	13 0	2	5500	Yokosuka	1900	..	..	..	2 4·7-in. Q.F., 4 3-pr.	5	21·0	200	..
cr.	Chitose*	S.	4760	396 0	49 0	17 7	2	Nor. 15,500	San Fr'cisco	1898	205,200	4½	4½–1¾	2 8-in. Q.F., 10 4·7-in., 12 12-pr., 2 6-pr., 2 2½-pr.	5	22·5	350 / 1000	405
"	Hashidate	S.	4277	295 0	50 10	21 2	2	5400	Japan	1891	..	12	2	1 12·5-in. (Canet), 11 4·7-in. Q.F., 5 6-pr., 11 3-pr., 6 M.	4	17·0	400	350
"	Itsukushima	S.	4277	295 0	50 10	21 2	2	5400	La Seyne	1891	..							
g.v.	Iwaki	W.	700	147 0	25 0	11 0	1	700	Japan	1883	..	..	..	1 5·9-in., 2 4·7-in.	..	10·0	600	115
"	Idzumi (ex Esmeralda)	S.	2950	270 0	40 0	18 3	2	6500	Elswick	1878	..	22	5–1	2 10 2-in. (Armstrong), 6 4·7-in. Q.F., 2 l. 6 M.	3	18·6	400	300
cr.	Kasagi	S.	5416	393 6	48 9	19 0	2	15,797	Philadelphia	1897	205,200	4½	4½–1¾	2 8-in., 10 4·7-in. Q.F., 12 12-pr., 6 1·8-in.	5	22·5	350 / 1000	405
t.c.	Katsuraki, Musashi	S.	1476	206 9	36 0	15 0	2	1600	Japan	1885	..	..	..	2 6-in. (Krupp), 5 4·7-in., 2 M.	2	13·0	..	242
g.v.	Maya	S.	615	154 0	27 0	10 0	2	700	Japan	1886	..	..	..	1 8·2-in., 1 4 7-in., 2 M.	..	13·0	60	113
cr.	Matsushima	S.	4277	295 0	50 10	21 2	2	5400	La Seyne	1890	..	12	2	1 12·5-in. (Canet), 11 4·7-in. Q.F., 5 6-pr., 11 3-pr., 6 M.	4	17·5	400	350
"	Miyako	S.	1800	314 9	36 0	13 2	2	6130	Kure	Bldg.	..	..	..	2 4·7-in. Q.F., 10 1·8-in.	2	20·0	..	..

cr.	Naniwa . . .	S.	3650	300	0	46	0	18	6	2	7235	Elswick .	1885	..	1½	3–2	2 10·2-in. (Armstrong), 6 5·9-in. Q.F., 2 3-pr., 10 M. .	4	18·72	800	350
g.v.	Oshima . . .	S.	630	164	0	27	0	10	0	1	700	Japan .	1890	..	..	..	4 4·7-in., Q.F., 8 l. . .	..	13·0	..	..
cr.	Sai yen (ex Tsi Yuen) .	S.	2300	263	3	33	0	15	9	2	2800	Stettin .	1883	..	9	3	2 8·2-in., 1 5·9-in., 4 l. 10 M.	4	14·5	230	200
cr.	Suma . . .	S.	2700	306	9	40	0	16	4	2	8500	Japan (Yokosuka) .	1896	237,000	..	2–1	2 6-in. Q.F., 6 4·7-in., 12 3-pr., 4 M.	2	20·0	200	..
„	Takao . . .	S.&W.	1774	230	0	33	0	13	0	2	2330	Japan .	1888	..	..	..	4 6-in. Q.F., 1 4⅔-in. do., 6 M. .		15·0	300	255
„	Takachiho . .	S.	3700	300	0	46	0	18	6	2	7500	Elswick .	1885	..	1½	3–2	2 10·2-in. (Armstrong), 6 5·9-in., 2 3-pr., 10 M. . .	4	18·7	800	365
„	Takasago . . }	S.	4160	360	0	46	6	17	0	2	15,500 B	Elswick .	{1897 Bldg.}	..	4½	4½	2 8-in. Q.F., 10 4·7-in., 12 12-pr., 6 2½-pr.	5	23·0	800/1000	..
„	Unnamed . . }																				
to.g.b.	Tatsuta . . .	S.	875	240	0	27	6	13	0	2	5500	Elswick .	1894	..	..	..	2 4·7-in. Q.F., 4 3-pdr. .	5	21·0	200	..
„	Ten-riu . . .	W.	1500	200	0	32	0	16	5	1	1250	Japan .	1882	..	..	..	1 6·6-in. (Krupp), 6 4·7-in., 2 l.	..	12·0	256	222
cr.	Tsukushi . . . (ex Arturo Prat)	S.	1350	210	0	32	0	15	0	2	2887	Elswick .	1882	..	4½	..	2 10-in. (Armstrong), 4 4·7-in. Q.F., 2 l., 4 M.	2	16·5	250	190
„	Yayeyama . .	S.	1600	315	0	34	6	15	0	2	5400	Japan .	1889	..	..	..	3 4·7-in. Q.F., 6 M. . .	2	20·0	..	200
„	Yamato . . .	..	1476	206	9	36	0	15	0	1	1600	Japan .	1885	..	..	..	2 6·6-in. (Krupp), 5 4·7-in., 4 M.	2	13·0	..	242
„	Yoshino . . .	S.	4180	350	0	46	6	17	0	2	15,000	Elswick .	1892	..	4½	4½–1¾	4 6-in. Q.F., 8 4·7-in., 23 3-pr.	5	23·0	1000*	300

The gunboats Chen-Pei, Chen Pien, Chen Nan, Chen Hsi, Chen Chung and Chen Tung (440 tons) were captured from the Chinese.

* Dimensions doubtful.

NETHERLANDS.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch	Cost.	Armour. Belt.	Armour. Turret.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.					inches.	inches.	inches.			knots	tons.	
c.d.s.t.	Bloedhond	I.	1683	182	8	46	3	10	6	2	680	Amsterdam	1869	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·7	104	118
"	Cerberus	I.	1584	185	8	44	0	9	9	2	534	Amsterdam	1869	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·0	80	118
"	De Ruyter	S.	4950	316	10	51	6	21	8	2	6000 Y	Amsterdam	1900	347,500	6 H.N.S.	10 N.S.	2	2 9·4-in., 4 5·9 Q.F., 4 2·9-in., 8 1·4-in.	3 2 sub.	16·0	680	..
"	Draak	I.	2234	213	6	49	2	12	0	2	807	Amsterdam	1877	..	8	11	1	2 11-in. (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	8·0	100	133
"	Evertsen	S.	3400	282	9	47	0	16	9	2	4735	Flushing	1894	..	6 H.S.	9½ H.S.	2	3 8·2-in., 2 5·9-in., 6 2·9-in. Q.F., 8 1·4-in.	3	16·0	280	260
c.d.s.t.	Haai	I.	1580	195	2	44	0	9	6	2	672	Rotterdam	1871	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	8·0	76	118
"	Heiligerlee	I.	1543	187	0	44	0	9	6	2	630	Birkenhead	1868	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	9·0	120	118
"	Hyena	I.	1580	192	2	44	0	9	6	2	654	Amsterdam	1870	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·0	76	118
a.g.b.	Isala	I.	383	159	4	25	0	4	5	2	306	Amsterdam	1876	..	5	5	1	2 4·7-in. (Krupp)	..	7·7	28	44
t.	Koning der Nederlanden (I)	I.	5400	279	9	49	9	19	8	2	4500	Amsterdam	1874	..	7½	9½	3	4 11-in., 4 4·7-in., 2 2·9-in., 6 1·4-in., 4 1·4-in. Q.F.	..	12·0	520	308
c.d.s.t.	Koningin Regentes	S.	4950	316	10	51	6	21	8	2	6000 Y	Amsterdam	1900	347,500	6 H. N. S.	10 H. N. S.	2	2 9·4-in., 4 5·9 Q.F., 4 2·9-in., 8 1·4-in.	3 2 sub.	16·0	680	..
c.d.s.t.	New Ship												Bldg.									
c.d.s.t.	New Ship*												Pro.									
t. & b.	Koningin Wilhelmina der Nederlanden † (I)	S. shd.	4600	327	5	48	10	20	0	2	5900	Amsterdam	1892	..	..	11	3	1 11-in., 1 8 2-in., 2 6·6-in., 2 2·9-in., 4 2·9-in. Q.F., 4 1·4-in., 6 1·4-in. Q.F., 2 M.	4	16·5	448	274
c.d.s.t.	Kortenaer	S.	3400	282	9	46	11	16	9	2	4658	Amsterdam	1894	..	6 H.S.	9½ H.S.	2	3 8·2-in., 2 5·9-in., 6 2·9-in. Q.F., 8 1·4-in.	3	16·0	280	260
"	Krokodil	I.	1547	187	0	44	0	9	8	2	630	Birkenhead	1868	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	9·0	120	118
"	Luipaard	I.	1610	194	9	44	0	9	7	2	680	Rotterdam	1876	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 8-pr. Q.F., 2 M.	..	9.0	120	118

c.d.s.t.	**Matador**	I.	2000	209	6	47	3	10	6	2	691	Rotterdam .	1878	..	5½	11	..	2 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·5	100	130
a.g.b.	**Merva**	I.	383	159	4	24	11	4	5	2	395	Amsterdam .	1879	..	5	5	1	2 4·7-in. (Krupp) . . .	..	8·0	28	44
„	**Mosa**	I.	373	159	6	24	11	4	5	2	400	Amsterdam .	1878	..	5	5	1	2 4·7-in. (Krupp) . . .	..	8·0	28	44
c.d.s.t.	**Panter**	I.	1580	159	3	44	0	9	6	2	560	Amsterdam .	1870	..	5½	9½	..	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·0	76	118
c.d.s.t.	**Piet-Hein** . . .	S.	3400	282	9	46	11	16	9	2	4736 (*t*)	Rotterdam .	1894	..	6 H.S.	9½ H.S.	2	3 8·2-in., 2 5·9-in., 6 2·9-in., Q.F., 8 1.4-in.	3	16·2 (*t*)	280	260
t.	**Prins Hendrik der Nederlanden**	I.	3375	240	0	44	0	17	10	2	2000	Birkenhead .	1866	..	4½	10	⅝	4 9-in. 13-ton M.L.R. (Armstrong), 4 4·7-in. (Krupp), 2 2·9-in., 4 1·4-in. Q.F., 6 M.	..	11·0	380	228
t. & b.	**Reinier Claeszen** . .	S.	2479	229	5	44	4	15	0	2	350	Amsteram .	1891	..	4¾–2 *comp.*	11	3	1 8·2-in. (Krupp), 1 6·6-in., 1 2·9-in., 4 1·9-in. Q.F., 3 1·4-in.,	2	12·5	88	160
a.g.b.	**Rhenus**	I.	388	160	5	25	0	4	6	2	310	Amsterdam .	1877	..	5	5	1	2 4·7-in. (Krupp) . . .	..	7·5	28	44
c.d s.t.	**Schorpioen** . . .	I.	2235	205	0	38	0	16	6	2	2225	La Seyne .	1868	..	6	11	1	1 11-in. 28-ton (Krupp), 2 2·9-in., 5 3-pr. Q.F., 2 M.	..	13·0	200	160
„	**Stier**	I.	2112	205	0	38	0	16	4	2	2250	Birkenhead .	1868	..	11	8	1	1 11-in. 28-ton (Krupp), 2 2·9-in., 5 3-pr. Q.F., 2 M.	..	12·4	160	154
a.g.b	**Vahalis**	I.	365	126	0	27	9	5	3	2	240	Rotterdam .	1870	..	4	1	½	2 3-pr. Q.F.	..	7·5	24	34
c.d.s.t.	**Wesp**	I.	1580	195	2	44	0	9	6	2	740	Amsterdam .	1871	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	8·0	76	118

* Estimates, 1901.

† Has received new engines and boilers.

NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
cr.	Alkmaar	Cp. shd.	1068	178	9	30	2	15	7	1	686	Amsterdam	1874	..	..	..	1 5 9-in. (Krupp), 6 4·7-in., 1 2·9-in., 4 1·4-in. Q.F., 2 M.	..	10·0	130	112
cr.	Atjeh	I. & W.	3440	301	0	41	0	21	4	1	2700	Amsterdam	1876	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 8 3-pr. Q.F., 8 smaller.	..	13·5	440	301
g. v	Bali (I)	I. & W. shd.	853	175	9	29	6	21	1	1	400	Rotterdam	1878	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	80	104
"	Batavia (I)	I. & W. shd.	850	175	6	29	6	11	10	1	400	Amsterdam	1876	..	..	..	1 7-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	95	104
"	Bellona	I.	920	178	5	32	9	12	6	1	310	Amsterdam	1892	..	..	..	1 5·9-in., 7 4·7-in., 3 2·9-in., 13 smaller.	..	8·5	50	87
"	Benkoelen (I)	I. & W. shd.	853	147	7	29	6	11	10	1	446	Rotterdam	1879	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·5	100	99
"	Bonaire	I. & W. shd.	853	175	6	29	6	12	7	1	412	Rotterdam	1877	..	..	..	1 5·9-in., 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F., 2 M.	..	9·0	104	84
"	Borneo (I)	Cp. shd.	800	176	6	31	0	13	4	1	1040	Glasgow	1892	..	..	..	6 4·1-in., 1 2·9-in., 2 1·4-in. Q.F., 2 M.	..	13·0	124	106
"	Ceram (I)	S. & W. shd.	550	173	2	25	7	10	3	1	800	Flushing	1887	..	..	..	3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	12·5	70	82
"	Condor (I)	Cp. shd.	350	126	0	20	0	10	0	1	300	Amsterdam	1885	..	..	..	1 2·3-in., 2 2-in.	..	10·0	26	40
cr.	De Ruyter	I. & W. shd.	3517	302	1	41	0	22	1	1	3300	Amsterdam	1880	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 8 3-pr. Q.F., 8 smaller.	..	14·5	360	30
g. v.	Edi (I)	S.	810	166	0	30	9	11	9	2	1100	Flushing	1897	..	..	..	3 4·7-in. Q.F., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
"	Flores (I)	S. & W. shd.	550	173	2	25	7	11	4	1	650	Amsterdam	1887	..	..	..	3 4·7-in, 1 2·9-in., 2 1·4-in. Q.F.	..	11·7	75	82
cr.	Friesland	S.	3900	294	0	48	6	17	8	2	10000 Y	Rotterdam	1896	285,700	..	2	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 smaller.	4	19·8 (t)	400	306

cr.	Gelderland	S.	4033	310	8	48	6	17	8	2	10000 Y	Feijenoord	1898	..	..	2¼	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	..
cr.	Holland	S.	3900	294	0	48	6	17	8	2	10000 Y	Amsterdam	1896	285,700	..	2	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	19·6 (t)	400	306
g.v.	Java (I)	I. & W. shd.	1300	205	4	31	2	14	1	1	1050	Rotterdam	1885	..	..	..	1 5·9-in., 3 4·7-in., 1 2·9-in., 2 1·4-in. Q.F.	..	12·5	160	114
cr.	Koningin Emma der Nederlanden	I. & W. shd.	3528	301	0	41	0	21	4	1	2730	Amsterdam	1879	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 8 3-pr. Q.F., 8 M.	..	14·0	470	301
g.v.	Lombok (I)	S. & W. shd.	600	172	0	27	3	11	0	1	990	Amsterdam	1891	..	..	..	3 4·7-in., 1 2·9-in., 2 3-pr. Q.F.	..	12·0	55	87
”	Makasser (I)	I. & W. shd.	850	177	0	29	6	11	10	1	320	Amsterdam	1877	..	..	..	1 6.3-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	8·5	96	104
”	Madura (I)	I. & W. shd.	853	177	0	29	6	11	10	1	400	Amsterdam	1880	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	85	104
”	Mataram (I)	S.	810	166	0	30	9	11	9	2	1100	Amsterdam	1896	..	..	..	3 4·7-in. Q.F., 2 3-in., 2 1·4-in.	..	13·0	113	95
”	Nias (I)	S.	810	166	0	30	9	11	9	2	1227	Amsterdam (Huygens)	1895	..	..	..	3 4·7-in. Q.F., 2 2·9-in., 4 1·4-in.	..	13·0	120	95
cr.	Noord-Brabant	S.	4033	299	0	48	6	17	9	2	10000 Y	Flushing	1899	..	..	2¼	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	..
”	Padang (I)	I. & W. shd.	853	176	6	29	6	11	10	1	400	Rotterdam	1878	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	80	104
”	Pelikaan (I)	S. & W. shd.	400	131	2	24	1	8	8	..	485	Rotterdam	1891	..	..	..	3 4·7-in. Q.F., 1 3-in., 2 3-pr. do.	..	11·35	43	40
”	Pontianak (I)	C. shd.	730	163	8	30	3	11	9	1	360	Amsterdam	1873	..	..	..	1 6·3-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·5	90	104
”	Sambas (I)	C.	654	137	10	28	10	11	10	1	374	Rotterdam	1874	..	..	..	1 7-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 1 1·4-in. Q.F.	..	8·5	85	100
”	Serdang (I)	S	810	166	0	30	9	11	9	2	1100	Flushing	1897	..	..	..	3 4·7-in. Q.F., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
sl.	Sommelsdijk	I. & W. shd.	1013	178	5	31	0	14	0	1	700	Amsterdam	1881	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in.	..	10·0	150	88
cr	Sumatra (I)	S.	1720	229	6	37	0	14	0		3750	Amsterdam	1890	..	..	1½	1 8·2-in., 1 5·9-in., 2 4·7-in., 1 2·9-in., 4 3-pr. Q.F., 2 M.		17·0	225	183

NETHERLANDS.—Cruising Ships—*continued.*

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
g.v.	**Sumbawa** (I)	S.	600	174	6	26	6	11	4	1	930	Flushing	1891	..	..	..	3 4·7-in., 1 2·9-in., 2 3-pr. Q.F.	..	12·5	60	87
,,	**Suriname**	I. & W. shd.	884	177	0	29	6	11	5	1	440	Amsterdam	1877	..	..	..	1 5·9-in. (Krupp), 2 4·7-in., 1 2·9-in., 2 1·4-in. Q.F., 3 M.	..	9·0	105	84
cr.	**Tromp**	I. & W. shd.	3512	301	0	41	0	21	4	1	2772	Amsterdam	1877	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 6 3-pr. Q.F., 2 M.	..	14·0	470	301
cr.	**Utrecht**	S.	4033	310	8	48	6	17	8	2	10000 Y	Amsterdam	1898	..	..	2¼	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	..
cr.	**Van Speyk**	I. & W. shd.	3728	302	1	41	0	23	0	1	2891	Amsterdam	1880	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 6 3-pr. Q.F., 2 M.	..	14·0	360	301
cr.	**Zeeland**	S.	3900	294	0	48	6	17	8	2	10589 Y *t.*	Flushing	1897	285,700	..	2	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	19·4 *t*	400	306
g.v.	**Zwaluw** (I)	I. & W. shd.	340	126	0	20	0	10	0	1	240	Flushing	1882	..	..	..	2 3-in., 2 2-in.	..	10·0	26	40

Gun-vessels of the Indian Navy, Arend, Flamingo, Raaf, Reiger, Valk, Zeeduif, and Zwaan (400 tons), launched between 1880 and 1891; Glatik (417 tons), 1894; Argus and Cycloop (438 tons), 1893; Sindoro and Soembing (642 tons), built at Soerabaia, 1877–78.

Sixteen Gunboats (*Staunch class*) of 268 tons, and of 100 to 171 H.P.; also *five small gunboats*, of 210 tons, and 124 to 174 H.P., and *one steel gunboat* of 108 tons and 172 I.H.P. The new programme contemplates the building of 3 unarmoured monitors, 14 gunboats and 3 schooners (see Chap. II.).

NORWAY.—Armoured Ships.

Class.	NAME	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in	ft.	in.	no.				£	in.	in.	in.			knots.	tons.	
c.d.s.t.	Eidsvold . / New Ship .	S.	3847	290	0	50	6	16	6	2	4500 Y.	Elswick	1900 / Bldg.	..	6 H.N.S.	6 H.N.S.	2	2 8·2-in., 6 5·9-in. Q.F., 8 12-pr., 6 3-pr.	2 (sub)	16·5	400 / 600	261
„	Mjölner .	I.	1515	203	5	45	11	11	10	1	450	Norrkoping	1868	66,800	5	12	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	8·0	138	80
„	Norge .	S.	3847	290	0	50	6	16	6	2	4500 Y.	Elswick	1900	..	6	6	2	2 8·2-in., 6 5·9-in. Q.F., 8 12-pr., 6 3-pr.	2 (sub)	16·5	250 / 400	248
„	Harald Haarfagre / Torkenskjold	S.	3556	280	0	48	6	16	6	2	3700	Low Walker	1896 / 1897	190,000	H.S. 7 H.S.	H.S. 8	2	2 8-in. Q.F., 6 4·7-in., 6 12-pr., 6 1½-pr.	2 (sub)	17·2† t.	200 / 500	248
„	Skorpionen .	I.	1447	200	2	45	11	11	6	1	350	Horten	1866	..	5	12	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	6·0	138	80
„	Thor .	I.	2003	203	5	49	3	13	2	1	600	Horten	1872	..	7	14½	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	8·0	200	90
„	Thrudvang .	I.	1515	200	2	45	11	11	10	1	500	Horten	1867	..	5	12	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	8·0	138	80

† Natural draught.

Cruising Ships.

Class.	NAME	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
g.b	Æger .	S.	393	108	6	29	6	8	0	2	450	Horten	1892	..	..	1½	1 8·2-in.. 1 2·7-in. Q.F., 2 1·9-in.	..	9·0	..	..
g.v	Ellida .	W.	1000	187	0	32	8	14	4	2	900	Horten	1880	..	..	..	5 5·9-in. 4-ton (Krupp), 1 4·7-in., 1 l., 2 M.	1	12·0	97	128
„	Frithjof .	S.	1371	216	6	32	10	13	3	2	300	Horten	1896	..	..	..	2 4·7-in. 4 2·9-in. Q.F., 4 1·4-in., 2 l.	3 (1 sub.)	..	..	..
„	Heimdal .	S.	630	167	3	26	9	11	8	1	700	Christiania	1892	..	..	..	4 2 5-in. Q.F.	..	12·0	22	..
corv.	Nord Stjernen .	W.	1609	216	6	39	4	17	9	1	800	Horten	1862	..	..	..	6 6·2-in. 3-ton M.L.R., 10 8-in. smooth-bore, 3 l.	..	9·0	195	216
g.r.	Sleipner .	I.	580	173	10	25	11	9	6	2	800	Horten	1877	..	..	..	1 10·2-in. 22-ton (Krupp), 1 5 9-in. 4-ton do., 1 M.	1	12·0	80	87
to.g.b.	Valkyrien.	S.	380	190	0	24	2	9	2	2	3300	Elbing	1896	..	..	..	2 2·7-in. Q.F., 1 M.	2	23·2 t	..	..
g.v.	Viking .	S.	1113	203	6	30	6	13	0	2	2000	Horten	1891	..	..	1½	2 5·9-in. (Arms.), 4 2·5-in Q.F., 4 1·4-in., 2 M.	3	15·0	140	..

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns in each.
Sixteen smaller Gunboats, of 60 tons, 70 I.H.P., and 7½ knots speed; each armed with one 5½-inch gun. Also several smaller gunboats.
A first-class gunboat, No. 4, of 395 tons, in hand.

PORTUGAL.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Battery.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
c.b.	**Vasco da Gama** . .	I.	2422	200	0	40	0	18	0	2	3600	Blackwall .	1876	132,000	9	10	3	2 10 2-in. 18-ton (Krupp), 1 5·9-in., 2 2·5-in., Q.F., 2 M.	..	13·2	280	218
c.d.s.	2 Unnamed . . .	S.	~~2~~500	229	8	42	8	13	6	2	3000	..	Pro.	..	7¾	7¾	2	2 9 4-in., 4 4·7-in. Q.F., 4 1·8-in., 4 M.	2	15·0	..	..

Cruising Ships.

Class.	NAME	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
cr.	**Adamastor** . .	S	1993	250	0	35	0	14	0	2	4000	Leghorn .	1896	..	5	3	2 5·9-in. Q.F., 4 4·7-in., 4 2·2-in., 4 M.	3	18·0 t.	..	..
corv.	**Affonso de Albuquerque**	I. & W.	1111	203	0	33	0	13	6	1	1360	Blackwall .	1884	56,500	..	..	2 6-in. (Armstrong), 5 4·7-in., 2 2·5-in. Q.F., 2 M.	..	13·3	140	183
,,	**Bartholomeu Dias** .	W.	2377	207	0	37	5	20	6	1	400 (nom.)	Blackwall .	1858	..	..	..	8 5-in.	..	10·0	360	271
g.v.	**Bengo**	I. & W.	462	125	6	24	6	9	0	1	400	Birkenhead .	1879	22,500	..	..	1 6-in., 2 3·4-in. . . .	..	10·0	80	88
	Diu	W.	729	147	0	27	6	13	0	1	700	Lisbon .	1889	..	..	..	1 5·9-in. (Krupp), 2 4·7-in., 1 3 pr. Q.F., 2 M.	..	12·0	80	114

cr.	Dom Carlos I.	S. shd.	4100	360	0	46	6	17	6	2	12,500 Y.	Elswick	1898	..	..	4	4 5·9-in. Q.F. (Armstrong), 8 4·7-in., 12 3-pr., 6 1-pr., 4 M.	5 (3 sub.)	22·0	1000	260
g.v.	Dom Luiz I.	S.	721	151	0	27	3	13	8	2	512	Lisbon	1895	..	..	..	4 4·1-in., 3 2·5-in. Q.F., 3 M.	..	9·9	100	..
„	Douro	W.	587	142	9	26	0	11	0	1	400	Lisbon	1873 1877	..	..	..	1 5·9-in. 4-ton, 2 4·7-in., 1 M.	..	10·0	85	107
corv.	Duque da Terceira (training)	W.	1430	179	6	34	0	15	6	1	660	Lisbon	1864	..	..	..	2 4·7-in., 2 2·5-in. Q.F., 1 M.	..	9·0	130	178
g.v.	Liberal	I. shd.	580	140	0	25	6	10	6	1	580	Birkenhead	1884	32,500	..	..	1 6-in. 4-ton (Armstrong), 3 4-in., 2 M.	..	11·0	90	109
corv.	Mindello	C.	1124	170	0	35	9	14	0	1	900	Blackwall	1876	74,500	..	..	2 7-in. 4-ton M.L.R. (Armstrong), 4·47-in. 2 M.	..	11·5	130	169
g.v.	Mandovi	I. shd.	462	125	6	24	6	9	0	1	400	Birkenhead	1879	22,500	..	..	1 5·9-in., 2 3·4-in., 2 M.	..	10·0	80	86
„	Quanza	W.	587	142	9	26	0	11	0	1	500	Lisbon	1877	..	..	..	1 5·9-in. 4-ton, 2 4·7-in., 1 M.	..	10·0	85	107
corv.	Rainha de Portugal	C.	1124	170	0	35	9	14	0	1	900	Blackwall	1876	74,500	..	..	2 7-in. M.L.R. (Armstrong), 4 4·7-in., 2 M.	..	11·5	130	169
cr.	Rainha Amelia	S.	1660	246	0	36	0	14	8	2	5000 Nor.	Lisbon	1899	..	..	1	4 5·9-in. Q.F., 2 3·9-in., 2 3-pr., 4 M.	2	17·5	..	250
g.v.	Rio Ave	W.	378	120	0	22	0	10	6	1	180	Lisbon	1880	..	..	..	1 4·7-in. (Armstrong), 2 3-in.	..	8·0	60	90
„	Rio Lima	I. shd.	638	148	6	27	6	10	6	1	500	Birkenhead	1875	33,000	..	..	1 7-in. 4-ton (Armstrong), 4 4-in., 2 M.	..	11·0	100	109
„	Sado	C.	645	148	6	28	0	10	6	1	500	Birkenhead	1875	35,500	..	..	1 7-in. 4-ton (Armstrong), 4 4·7-in., 1 M.	..	11·0	100	109
cr.	São Gabriel São Rafael	S. shd.	1800	246	0	35	6	14*	3	2	4000 N.S.	Havre	1898	..	..	1½	2 5·9-in. Q.F. (Canet), 4 4·7-in., 8 1·8-in., 2 M.	1	17·5 t.	500	..
g.b.	São Salvador	S.	721	151	0	27	3	13	8	2	..	Lisbon	Bldg.	..	..	..	4 4·1-in., 3 5·2-in. Q.F., 3 M.	..	11·0	100	..
„	Tamega	C.	645	148	6	28	0	10	6	1	500	Birkenhead	1875	35,500	..	..	1 7-in. 4-ton (Armstrong), 4 4·7-in., 1 M.	..	11·0	100	109
„	Tejo	W.	587	142	9	26	0	11	0	1	400	Lisbon	1869	..	..	..	1 5·9-in. 4-ton, 2 4·7-in.	..	10·0	85	107
„	Vouga	W.	730	160	9	27	6	12	0	1	600	Lisbon	1882	..	..	..	4 4-in., 2 1·8-in. Q.F., 2 M.	..	10·0	100	109
„	Zaire	I. shd.	580	140	0	25	6	10	6	1	580	Birkenhead	1884	32,500	..	..	1 6-in. (Armstrong), 3 4-in. 2 M.	..	11·0	90	109
„	Zambeze	W.	641	143	0	25	9	12	0	1	500	Lisbon	1886	..	..	..	1 6-in. (Armsg.), 2 4-in., 2 M.	..	10·0	85	107
g.v.	One unnamed	S.	300	..		..		..		..	..	Lisbon	Bldg.	..	..	..	.. .. ..	..	..	..	..

* Mean draught. † Bunker capacity.

Fifteen small Gunboats and about 29 light draught steel river-gunboats. Two gunboats of 220 tons, the Al. Baptista de Andrade and Thomaz Andrea, are building for Mozambique and Timor.

RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Material of Hull.	Displacement.	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Adm. Chichagoff**	I.	3505	254	0	42	7	18	0	1	2060	St. Petersburg	1868	..		6	..	2 11-in. 28-ton, 4 4-pr., 6 Q.F., 4 l.	..	10·5	300	261
”	**Adm. Greig**	I.	3462	254	0	42	7	17	6	1	2031	St. Petersburg	1868	..	4½	6	..	3 11-in. 28-ton, 6 Q.F., 2 l.	..	10·0	300	280
”	**Adm. Lazareff**	I.	3462	254	0	43	0	17	6	1	2004	St. Petersburg	1867	..	4½	6	..	3 11-in. 28-ton, 6 Q.F., 4 l.	..	10·25	300	280
a.c.	**Adm. Nahimoff**	S. shd.	8524	333	0	61	0	25	0	2	9000 B.	St. Petersburg	1885	572,000	10 comp.	8 comp.	3	8 8-in., 10 6-in., 10 Q.F., 4 3-pr., 6 M.	4	16·7	1200	567
”	**Adm. Boutakoff** *	S.	5985	341	6	59	3	17	3	2	7000	St. Petersburg (New Admiralty)	1900 Bldg.	..	7	7–8	3	1 12-in., 2 8-in., 4 6-in. Q.F., 6 1·8 in., 8 M.	4 2 sub.	16·0	400	318
”	**Adm. Oushakoff**	S.	4126	265	0	52	6	17	0	2	5000	St. Petersburg	1893	410,000	10	7–8	3	4 9-in., 4 6-in. Q.F., 6 1·8-in. Q.F., 8 M.	4	16·0	400	318
”	**Adm. Seniavin**												1894									
c.d.s., t.	**Adm. Spiridoff**	I.	3505	254	3	42	7	19	1	1	2007	St. Petersburg	1868	..	6	6	..	2 11-in. 28-ton, 4 4-pr., 6 Q.F., 4 l.	..	10·5	300	260
b.	**Alexander II.**	S. shd.	9927	326	0	67	0	23	0	2	8000	St. Petersburg	1887	..	14 comp.	10 comp.	2½	2 12-in. 50-ton, 4 9-in. 19-ton, 8 6-in., 4 6-pr. Q.F., 4 3-pr., 6 M.	5	16·5	1200	604
b.	**Alexander III.**	S.	13,600	397	0	76	0	26	0	2	16,000 B.	St. Petersburg (Baltic)	Bldg.	..	9 K.S.	6 K.S.	4	4 12-in., 12 6-in. Q.F., 20 3-in., 20 3-pr., 6 1-pr.	6 5 sub.	18	2000	..
a.c.	**Bayan**	S.	7800	445	0	57	0	22	0	2	16,500 B.	La Seyne	1900	..	8–3 K.S.	6 K.S.	2	2 8-in., 8 6-in. Q.F., 20 2·9-in., 7 1·8-in.	2 sub	21	750 1100	..
b.	**Borodino**	S.	13,600	397	0	76	0	26	0	2	16,000 B.	St. Petersburg (New Admiralty)	Bldg.	..	9 K.S.	5 K.S.	4	4 12-in., 12 6-in. Q.F., 20 3-in., 20 3-pr., 6 1-pr.	6 5 sub.	18	2000	..
b.	**Catherine II. (B.S.)**	I. & S.	10,180	331	0	69	0	26	6	2	10,600 B.	Nicolaieff	1886	900,000	16 comp	14 comp.	3	6 12-in. (56-ton), 7 6-in., 8 6-pr. Q.F., 6 M.	7	15·5	886	325
b.	**Cesarevitch**	S.	13,110	388	8	76	2	26	*0	2	16,300 B	La Seyne	1901	..	9¾–8¾ K. S.	10–11 K. S.	2½	4 12-in., 12 6-in. Q.F., 20 3-in., 20 1·8-in., 6 1·4-in., 4 M., 2 l.	6 2 sub.	18·0	900 1850	..

* Particulars doubtful.

c.d.s., t.	Charodeika .	I.	1881	206	9	42	7	10	6	2	786	St. Petersburg.	1867	..	4½	6	1	4 9-in., 2 Q.F. and 2 M. .	..	8·0	250	171
a.c.	Dmitri Donskoi	S. shd.	5882	296	5	52	0	24	4	2	7000	St. Petersburg.	1883	..	6	unard.	2½	6 6-in. Q.F., 10 4·7-in. Q.F., 16 Q.F. and M., 4 l.	4	16·5	400	510
t.	Dvenadzat Apostoloff (Twelve Apostles) B.S.	S.	8076 •	330	0	60	0	25	6	2	11,500	Nicolaieff .	1890	..	14 *comp.*	12 *comp.*	2½	4 12-in. 52-ton, 4 6-in., 8 3-pr. Q.F., 10 M.	6	16·6	800	500
a.c.	General Admiral .	I. shd.	4722	285	5	49	3	21	0	1	4472	St. Petersburg	1873	..	6	..	..	6 8-in., 2 6-in., 10 Q.F. and M., 5 l.	4	14·2	1000	312
c.d.s.	General Admiral Apraxine	S.	4200	277	6	52	6	17	6	2	5757 (*t*)	St. Petersburg (New Admiralty)	1896	..	10 H.S.	7·8	3	3 10-in., 4 6-in. Q.F., 6 1·8-in., 8 1·4-in.	4	15·0 (*t*)	215	318
a.c.	Gertzog Edinburgski	I. & W.	5050	285	5	49	3	21	0	1	5222	St. Petersburg	1875	..	6	6	..	4 8-in., 5 6-in., 12 Q.F., 6 l. .	2	15·2	1000	500
b.	Georgi Pobiedonosets (George the Victorious) B.S.	S.	10,280	320	0	69	0	26	7	2	10,600 13,468 (*t*)	Sebastopol .	1892	431,000	16	12	..	6 12-in. 56-ton, 7 6-in., 8 3·9-in. Q.F., 6 M.	7	16·5	700	500
a.g.b.	Gremiastchy . .	S.	1500	225	0	41	0	11	0	2	2500 B.	St. Petersburg	1892	..	5	..	1½	1 9-in., 1 6-in., 10 Q.F. .	2	15·0	100	142
a.c.	Gromoboi . . .	S. d.	12,336	473	0	68	6	26	0	3	14,500	St. Petersburg (Baltic)	1899	..	6 H.S.	6 H.S.	3	4 8-in. Q.F., 16 6-in., 6 4·7-in., 20 3-in., 36 small Q.F. and M.	5 4 sub	20	2500	..
a.g.b.	Grozjastchy . .	S.	1492	229	0	41	8	11	0	2	2000 B.	St. Petersburg	1890	..	5	..	1½	1 9-in., 1 6-in., 8 Q.F. .	2	15·0	100	120
„	Khrabry . . .	S.	1492	229	0	41	8	11	0	2	3000 Nic.	St. Petersburg (New Admiralty)	1895	..	5	..	1½	1 9-in., 1 6-in., 8 Q.F. . .	2	15·0	100	120
c.b	Kniaz Pojarski .	I.	5138	272	4	49	3	23	11	1	2835	St. Petersburg	1867	..	4½	4½	..	2 8-in., 2 6-in., 10 Q.F. and M., 4 l.	..	11·0	600	452
t.	Kniaz Potemkine Tavritchesky, B.S.	S.	12,480	372	4	72	10	27	0	2	10,600 B.	Nicolaieff .	1900	..	10	11½–9½	2½	4 12-in., 16 6-in. Q.F., 4 4·7-in., 16 1·8-in., 14 1·4-in., 2 l.	5	17·0	900*	636
b.	Kniaz Souvaroff .	S.	13,600	397	0	76	0	26	0	2	16,000 B.	St. Petersburg (Baltic)	Bldg.	..	9 H.S.	5 H.S.	4	4 12-in., 12 6-in. Q.F., 20 3-in., 20 3-pr., 6 1-pr.	6 5 sub.	18	2000	..
c.d.s., br.	Kreml	I.	3480	219	10	52	5	15	0	1	2822	St. Petersburg	1864	..	4½	4½	..	8 8-in., 6 6-in., 5 Q.F., 6 l. .	..	9·0	..	63
a.c.	Minin	I.	6136	298	6	49	3	25	3	1	6000 B	St. Petersburg	1878 altd.	..	7	8	..	4 8-in., 12 6-in., 16 Q.F., 4 l.	..	14·0	1200	450
c.d.s., br.	Netron-Menya .	I.	3494	219	10	53	0	15	6	1	1600	St. Petersburg	1864	..	4½	4½	..	14 8-in., 4 Q.F., 2 M., 4 l. .	1	9·0	500	63
t.	Navarin . . .	S.	10,206	338	0	67	0	25	0	2	9000	St. Petersburg	1891	772,995	16	12	..	4 12-in., 8 6-in., 14 Q.F., 4 l.	6	16·0	1200	..

* And liquid fuel.

RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.)

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.					£	inches.	inches.	inches.			knots.	tons.	
t.	**Nicolai I.**	S. shd.	9672	326 0	67 0	23 0	2	8000 B.	St. Petersburg	1888 1900	453,000	14 *comp.*	10 tur. 6-in. b. *comp.*	2½	2 12-in. 52-ton, 4 9-in. 19-ton, 8 6-in., 12 Q.F., 8 M., 4 l.	6	14·8	..	604
cir. c.d.s.	**Novgorod, B.S.**	I. shd.	2706	101 0	101 0	13 0	6	2000	Nicolaieff	1873	..	9–7	9	..	2 11-in., 8 Q.F., 2 M., 2 l.	..	6·0	200	150
b.	**Orel**	S.	13,600	397 0	76 0	26 0	2	16,000 W.T.	St. Petersburg (Galerny)	Bldg.	..	9 K.S.	6 K.S.	4	4 12-in., 12 6-in. Q.F., 20 3-in., 20 3-pr., 6 1-pr.	6 5 sub.	18	2000	..
t.	**Oslabya**	S.	12,674	401 3	71 6	25* 3	3	14,500	St. Petersburg (New Admiralty)	1898	..	9½ H. S.	9 H. S.	2¾	4 10-in., 11 6-in. Q.F., 16 3-in., 10 1·8-in., 17 1·4-in., 2 l.	6	18·0	1063 2056	732
a.g.b.	**Otvazny**	S.	1500	225 0	41 0	11 0	2	2000 2589 (*t*)	St. Petersburg	1892	..	5	..	1½	1 9-in., 1 6-in., 10 Q.F.	2	15·0 15.5 (*t*)	100	142
a.c.	**Pamyat Azova**	S. shd.	6675	377 0	51 0	23 0	2	B. 8000	St. Petersburg	1888	350,000	9 *comp.*	8 *comp.*	2½	2 8-in., 13 6-in., 14 Q.F., and 3 M.	7	18·8	1000	525
t.	**Peresviet**	S.	12,674	401 3	71 9	26 0	3	14,500	St. Petersburg. (Baltic)	1898	..	9½ H. S.	9 H. S.	2¾	4 10-in., 11 6-in. Q.F., 16 3-in., 10 1·8-in., 17 1·4-in., 2 l.	6	18·0	1063 2056	732
c.d.s., br.	**Pervenetz**	I.	3279	219 10	52 5	14 9	1	1067	Blackwall	1863	..	4½	4½	..	6 8-in., 9 6-in., 7 Q.F., 8 l.	..	9·0	..	63
t.	**Peter Veliky**	I.	9891	328 2	62 4	23 9	2	8258	St. Petersburg	1872	..	14 8	8-6	3	4 12-in. 40-ton, 13 Q.F., 4 l.	1	14·5	1200	436
t.	**Petropavlovsk**	S.	10,960	367 6	69 0	26 0	2	14,213 (*t*)	St. Petersburg	1894	1,098,000	15¾	10 H. S.	3½	4 12-in., 12 5·9-in. Q.F., 34 smaller.	6	16·3*t*	900	..
t.	**Poltava**	S.	10,960	367 6	69 0	26 0	2	11,255 (*t*)	St. Petersburg	1894	1,098,000	15¾	10 H. S.	3½	4 12-in., 12 5·9-in. Q.F., 34 smaller.	6	16 2	900	..
b.	**Pobieda (Victory)**	S.	12,674	401 3	71 6	25* 3	3	14,500 B.	St. Petersburg (Baltic)	1900	..	9½ H. S.	9 H. S.	2¾	4 10-in., 11 6-in. Q.F., 16 3-in., 10 1·8-in., 17 1·4-in., 2 l.	6	18·0	1063 2056	732

b.	**Retvizan** . . .	~~S.~~	~~12~~,700	374	0	72	2	25	0	2	16,000 Nic.	Philadelphia .	1900	..	9 K. S.	10 K. S.	4	4 12-in., 12 6-in. Q.F., 20 3-in., 20 3-pr., 6 1-pr.	..	18·0	1016 2000	..
a. c.	**Rossia** . . .	S. shd.	12,130	480	0	68	6	26	0	3	14,500 B.	St. Petersburg	1896	..	10 H.S.	2 H.S.	2½	4 8-in., 16 6-in. Q.F., 12 3-in., 36 small Q.F. & M.	5	20·0	2500 †	725
t.	**Rostislav, B.S.** . .	S.	8880	341	0	66	6	24	0	2	8500	Nicolaieff .	1896	..	15¾ comp.	15¾ comp.	2–3	4 10-in., 8 5·9-in. (Canet), 12 1·8-in. Q.F., 4 1·5-in., 2 M.	2–3	16·0	550 † 800	..
a. c.	**Rurik**	S.	10,923	396	6	67	0	26	0	2	13,250	St. Petersburg .	1894	..	10 comp.	..	2½	4 8-in., 16 6-in., 6 4·7-in. Q.F., 18 small Q.F. & M.	5	18·0	2000	768
t.	**Sevastopol** . . .	S.	10,960	367	6	69	0	26	0	2	13,600	St. Petersburg .	1895	1,098,000	15¾	10 H. S.	3½	4 12-in., 12 5.9-in. Q.F., 34 smaller.	6	17·5	900	..
b.	**Sinope, B.S.** . .	I. & S.	10,180	331	0	69	0	26	6	2	13,000 B.	Sebastopol .	1887	900,000	16 comp.	14 comp.	3	6 12-in. 50-ton, 7 6-in., 8 Q.F., 6 M.	7	16·75	886	325
t.	**Sissoi Veliky** (Sissoi the Great)	S.	8880	341	0	66	6	24	0	2	8500	St Petersburg .	1894	796,333	15¾ comp.	15¾ comp.	3	4 12-in., 6 6-in. Q.F., 12 1·8-in., 4 1·4-in., 2 M.	6	16·0	550	..
b.	**Tchesmé, B.S.** . .	I. & S.	10,180	331	0	69	0	26	6	2	11,000	Sebastopol .	1886	900,000	16 comp.	14 comp.	3	6 12-in. 50 ton, 7 6-in., 8 Q.F., 6 M.	7	15·0	886	325
"	**Tria Sviatitelia, B.S.** .. (Three Saints.)	S.	12,480	357	6	72	2	27	0	2	10,600	Nicolaieff .	1893	..	18–16 H.S.	16 H.S.	3	4 12-in., 12 6-in. Q.F., 4 4-in., 4 7-in., 56 smaller Q.F. & M.	6 2 sub.	16·0 18·0 (*t*)	1000	582
circular c.d.s.	**Vice-Admiral Popoff, B.S.**	I. shd.	3590	120	0	120	0	13	5	6	3066	Nicolaieff .	1875	..	16	16	..	2 12-in. 40-ton, 2 Q.F., 6 l. .	..	8·0	250	453
a.c.	**Vladimir Monomach**	S. shd.	6061	296	6	52	0	24	0	2	7000	St. Petersburg .	1882	..	6 comp.	..	3	5 8-in., 12 6-in., 18 Q.F. & M., 4 l.	2	15 2	400	550

* Mean draught. † And liquid fuel.

Ten old Monitors of 1566 tons have been removed from this list:—Uragan, Tifon, Streletz, Edinorog, Koldun, Lava, Bronenosetz, Latnik, Perun, and Vieschun; and one of 1461 tons—Smerch.

RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£		ins.			knots.	tons.	
to.g.b.	**Abrek**	S.	535	212	2	24	10	9	0	2	4506 (*t.*)	Abo	1896	53,600	..	½	.. ..	2	21·2 (*t.*)	..	..
2nd cl. *cr.*	**Admiral Korniloff**	S. & W.	5000	351	0	48	6	20	0	2	9000	St. Nazaire	1887 1895	296,000	..	2½	2 8-in., 14 6-in., 6 1·8-in. Q.F., 6 1·4-in., 5 l.	6	17·5	1100	425
cr.	**Afrika**	I.	2590	285	5	39	4	17	1	1	1350	Chester, U.S.	1877	..	..	..	3 6-in., 6 Q.F., 4 M., 4 l.	..	13·0	975	257
cr.	**Asia**	I.	2500	269	0	36	0	16	5	1	1100	Philadelphia	1878	..	..	..	2 6-in., 5 Q.F., 6 M., 5 l.	..	13·0	750	260
cr.	**Askold**	S.	6000	426	6	49	3	20	4	3	19000 Schulz	Kiel (Germania)	1900	..	..	3	12 6-in. Q.F., 12 3-in., 8 1·8, 2 1·4 in., 2 M.	6 (2sub.)	23·0	710 1100	500
cr.	**Aurora**	S.	6630	413	4	55	9	21	0	3	11610 B.	St. Petersburg (Galerny)	1900	..	..	2½	8 6-in. Q.F., 20 3-in., 8 1·4-in.	4	20·0	..	..
to.g.b.	**Bakan** (Mining)	S. shd.	840	180	6	15	7	11	6	2	3800 B.	St. Petersburg (Baltic)	1896	..	..	..	4 Q.F.	..	12·0	..	..
g.v.	**Bobr**	S.	950	187	0	35	2	9	6	2	1150	Kretona	1884	43,000	..	..	1 9-in., 1 6-in., 5 Q.F., M., & 6 l.	..	12·0	..	..
cr.	**Bogatyr**	S.	6750	416	8	54	6	20	10	2	19500 Nor.	Stettin (Vulcan)	1900	..	5 N.S.	2¾	12 6-in. Q.F., 12 3-in., 6 1·8 Hotchkiss, 3 l.	6 (2sub.)	23·0	720 1100	580
cr.	**Boyarin**	S.	3000	347	10	40	0	..		3	11500 B.	Copenhagen	1900								
cr.	Unnamed	S.	3000	347	10	40	0	..		3	17000 W.T.	St. Petersburg (Baltic)	Bldg.	..	..	2	6 6-in. Q.F. and smaller guns.	2	25·0	..	..
to.g.b.	**Captain Sacken, B.S.**	S.	742	210	0	24	0	8	10	2	3400	Nicolaieff	1888	40,700	..	..	7 4·7-in. Q.F., 7 M.	6	18·5	97	120
g.v.	**Chernomoretz, B.S.**	S.	1224	210	0	35	0	11	1	1	2000	Nicolaieff	1889	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5	250	161
„	**Coreetz**	S.	1213	206	0	35	0	10	6	2	1500	Stockholm	1886	..	..	1½	2 8-in., 1 6-in., 2 Q.F., 4 l.	2	13·5	..	..
cr.	**Diana**	S.	6630	413	4	55	9	21	0	3	11610 B.	St. Petersburg (Galerny)	1899	..	..	2½	6 6-in. Q.F., 20 3-in., 8 1·4 in.	4	20·0	..	..
corv.	**Djigit**	I. & W.	1456	206	9	32	10	16	1	1	1700	St. Petersburg	1876	..	..	..	3 6-in., 8 Q.F. & M., & 4 l.	..	13·0	250	172
„	**Donetz, B.S.**	S.	1224	210	0	35	0	11	0	1	2000	Nicolaieff	1887	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5	250	161

to.g.b.	**Gaidamak**	S.	500	192	6	24	2	7	6	2	3000	Abo	1893	..	..	..	2 1·8-in. Q.F., 7 1·4-in., 10 M.	3	22·0	90	87
g.v.	**Gilyak**	S.	963	200	0	37	0	9	3	2	1000 B.	St. Petersburg (New Admiralty)	1897	..	2	..	1 4·7-in. Q.F., 5 3-in., 2 2·6-in., 4 1·8-in.	1	12·0	..	..
to.g.b.	**Griden, B.S.**	S.	400	192	6	24	2	7	6	2	3500	Nicolaieff	1893	66,600	..	..	2 1·8-in. Q.F., 7 1·4-in., 10 M.	3	22·0	90	60
g.v.	**Jermak**	I.	706	154	3	26	3	11	2	1	125	St. Petersburg	1870	..	..	..	2 guns	..	..	..	..
to.g.b.	**Kazarsky, B.S.**	S.	400	190	0	24	0	8	6	2	3500	Elbing	1890	32,500	..	..	9 1·8-in. Q.F. (Hotchkiss)	2	23·0	90	60
corv.	**Kreisser**	I. & W.	1653	206	9	32	10	16	1	1	1800	St. Petersburg	1875	..	..	..	2 6-in., 7 Q.F., 1 M., 4 l.	..	13·0	..	..
g.v.	**Kubanetz, B.S.**	S.	1224	210	0	35	0	11	0	1	1500 B.	Sebastopol	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F.	2	13·8	250	161
to.g.b.	**Lieutenant Ilyin**	S.	714	230	0	24	0	8	10	2	3500	St. Petersburg	1887	40,150	..	..	7 3-pr. Q.F., 10 M.	7	20·1	97	120
g.v.	**Mandjur**	S.	1416	210	0	35	0	11	0	2	1400	Copenhagen	1886	..	..	1½	2 8-in., 1 6-in., 7 Q.F., M., & 4 l.	2	14·0	..	..
corv.	**Nayezdnik**	I. & W.	1334	206	9	32	10	14	0	1	1719	St. Petersburg	1878	..	..	..	3 6-in., 7 Q.F. & M., 4 l.	..	13·0	250	172
cr.	**Novik**	S.	3000	347	10	40	0	..		3	17000 T.	Danzig (Schichau)	1900	..	..	2	6 6-in. Q.F. & smaller guns	2	25·0	..	..
corv.	**Oprichnik**	S. & W.	1426	206	9	32	10	14	0	1	1268	St. Petersburg	1880	..	..	..	3 6-in., 7 Q.F. & M., 4 l.	..	13·0	230	172
cr.	**Pallada**	S.	6630	413	4	55	8	21	0	3	11610 B.	St. Petersburg (Galerny)	1899	..	..	2½	6 6-in. Q.F., 20 3-in., 8 1·4-in.	4	20·0	..	..
3rd cl. *cr.*	**Pamyat Merkuriya, B.S.**	I. & S.	3050	295	0	41	0	17	0	1	3000	Toulon	1880	..	..	..	6 6-in., 8 Q.F. & M., 4 l.	2	16·0	1100	200
sl.	**Plastun**	I. & W.	1255	206	9	32	10	14	0	1	1268	St. Petersburg	1879	..	..	..	3 6-in., 7 Q.F. & M., & 4 l.	..	13·0	250	172
to.g.b.	**Posadnik**	S.	462	192	6	24	2	7	6	2	3600	Elbing	1892	111,000	..	..	2 1·8-in. Q.F., 7 1·4-in., 3 M.	3	22·0	90	87
corv.	**Razboynik**	I. & W.	1329	206	9	32	10	14	0	1	1786	St. Petersburg	1878	125,000	..	..	3 6-in., 7 Q.F. & M., & 4 l.	..	13·0	250	172

RUSSIA.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Rynda**	S. shd.	3508	265	9	45	11	16	1	2	3000	St. Petersburg	1885	..	..	1½	10 6-in., 9 Q.F., M., & 4 l.	4	14·8	710	322
g.v.	**Sivootch**	S.	950	187	0	35	0	9	6	2	1125	Stockholm	1884	43,000	..	..	1 9-in., 1 6-in., 5 Q.F., M., & 6 l.	..	12·5	..	..
corv.	**Strjelok**	I. & W.	1343	206	9	32	10	14	0	1	1528	St. Petersburg	1880	..	..	..	3 6-in., 7 Q.F., M., & 4 l.	..	13·0	250	172
cr.	**Svietlana**	S.	3828	331	3	42	8	18	9	2	3828 B.	Havre	1896	..	4	2	6 5·9 Q.F. (Canet), 10 1·8-in.	4	20·2 (*t.*)	1000	..
g.v.	**Teretz, B.S.**	S.	1224	210	0	35	0	11	0	..	1500 B	Sebastopol	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·8	250	161
„	**Uraletz, B.S.**	S.	1224	210	0	35	0	11	0	..	1500 B.	Sebastopol	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·8	250	161
cr.	**Varyag**	S.	6500	420	0	52	0	20	8	2	20000 Nic.	Philadelphia	1899	..	..	3 N S.	12 6-in. Q.F., 12 3-in., 6 1·4 Hotchkiss.	6 (2sub.)	23·0	770 1250	571
to.g.b.	**Voevoda**	S.	400	192	6	24	2	7	6	2	3600	Elbing	1892	111,000	..	..	2 1·8-in. Q.F., 7 1 4-in., 3 M.	3	22·0	90	87
sl.	**Vjestnik**	I. & W.	1255	206	9	32	10	14	2	1	1268	St. Petersburg	1879	..	..	..	3 6-in., 7 Q.F. & M., & 4 l.	..	13·0	250	172
to.g.b.	**Vzadnik**	S.	400	192	6	24	2	7	6	2	3000	Abo	1893	..	..	..	4 1 8-in. Q.F., 7 1 4-in. 10 M. & l.	3	22·0	250	172
sl.	**Zabiyaka**	I.	1234	219	10	29	6	14	9	1	1194	Philadelphia	1878	..	..	..	6 Q.F., 4 M., 5 l	..	14·5	90	87
g.v.	**Zaporojetz**	S.	1224	210	0	35	0	10	0	2	1500	Nicolaieff	1887	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5	250	161
cr.	Unnamed, A	S.	6375	413	4	52	5	20	8	2	20000 B.	Windau	Bldg.	..	..	2	12 6-in. Q.F., 12 3-in., 8 1·8-in.	5 (2sub.)	23.0	..	..
cr.	„ B											St. Petersburg	Pro.								
cr.	„ C	S.	6500	..		..		..		..	..	Nicolaieff	Pro.	..	..	..	..	..	..	..	..
cr.	„ D	S.	6500	..		..		..		..	..										

Baltic:—*Ten Gunboats, Staunch Class*, of 270 to 402 tons, 195 to 445 I.H.P., with 1 11-inch breech-loader, and 9 knots speed, and *two Gunboats* of about 180 tons and 7 knots speed. *Training Ships*, Bajan, Voin, Vierny, and Moriak. Ermach, very powerful ice-breaker. Black Sea:—*Twelve Steamers* (*Gun-vessels*, *Despatch-vessels, &c.*) 90 to 298 tons. *Imperial Yachts*, Standart, Polarnaia Svezda, Tsarevna, &c.

Auxiliary Steamers.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Speed.
			tons.	ft.	in.	ft.	in.	ft.	in.					
	Black Sea Co.													
Auxiliary Cruiser	**Czar**	S.	2340	319	0	37	0	23	6	1	350 nom.	Newcastle	1883	14
,,	**Czarevna**	,,	2340	319	0	37	0	23	6	1	350 nom.	,,	1883	14
,,	**Czaritza**	,,	2340	319	0	37	0	23	6	1	350 nom.	,,	1883	14
,,	**Grand Duke Alexis**	,,	2350	284	0	37	0	14	9	1	3500	Hebburn	1890	16
,,	**Grand Duke Constantine**	,,	2400	284	0	37	0	15	0	1	3500	,,	1891	16
,,	**Grand Duke No. 1**	,,	2400	288	0	37	0	15	0	1	2500	,,	Bldg.	14½
,,	**Grand Duke No. 2**	,,	2400	288	0	37	0	15	0	1	2500	,,	,,	14½
,,	**Emperor Nicolas II**	,,	..	..		..		..		..	..	,,	1895	..
,,	**Roumantzeff**	,,	760	212	0	28	0	7	6	2	1000	,,	1894	13
	Volunteer Fleet.													
,,	**Ekaterinoslav**	,,	10,500	440	0	49	6	24	0	2	3200	,,	1896	12
,,	**Khabarovsk**	I.	2700	265	0	36	0	14	6	2	1800	,,	1894	13
,,	**Kherson***	S.	10,225 B	493	0	54	3	24	0	2	{ 12,500 B 13,150 (*t.*) }	,,	1895	19½
,,	**Kiev**	,,	10,500	440	0	49	6	24	0	2	3200	Clydebank	1895	13
,,	**Kostroma**	I.	7975	360	0	42	0	23	6	1	2700	Hebburn	1888	14
,,	**Moskva***	S.	11,700 B	508	0	58	0	25	0	2	12,500 B.	Clydebank	1898	20
,,	**Nijni Novgorod**	I.	7876	325	0	40	0	23	6	1	2000	Elswick	1891	11½
,,	**Orel**	,,	7990	445	0	48	0	23	6	2	10,000	Hebburn	1889	19
,,	**Petersburg**	,,	9252	460	0	52	0	24	0	2	11,000	,,	1894	19
,,	**Poltava**	S.	10,225 B	493	0	54	3	24	0	2	12,500	Dumbarton	Bldg.	19½
,,	**Saratoff**	,,	8556	462	0	50	0	24	0	2	10,000	Glasgow	1892	19
,,	**Smolensk**	,,	11,850	506	6	58	0	24	0	2	16,500 B.	Newcastle (Hawthorn)	1901	20
,,	**Tamboff**	,,	8640	385	0	45	0	24	6	1	2,500	Dumbarton	1893	12¾
,,	**Vladimir**	,,	10,500	440	0	49	6	24	0	2	3,200	,,	1895	12
,,	**Voronej**	,,	10,500	440	0	49	6	24	0	2	3,200	,,	1895	12
,,	**Yaroslav**	,,	8640	385	0	45	0	24	6	1	2,500	,,	1893	12¾

* Armament, 3 4·7-in. Q.F., 20 smaller.

SPAIN.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in	ft.	in.	no.				£	in.	ins.	ins.			knots.	tons.	
a.c.b.	**Cardenal Cisneros**	S.	7000	347	10	61	0	21	10	2	15,000	Ferrol	1896	600,000	12	10½	2	2 11-in., 10 5·5-in. Q.F., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	5	20·0	1200	500
,,	**Cataluña**	~~S.~~	7000	347	10	61	0	21	10	2	15,000	Cartagena	1900	600,000	12	10½	2	2 11-in., 10 5·5-in. Q.F., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	5 (-ub.)	20·0	1200	484
a.c.t.	**Emperador Carlos V.**	S.	9235	380	0	67	0	25	0	2	18,500	Cadiz (Vea Murguia)	1895	734,000	2	10	6⅜	2 11-in. (Hontoria), 8 5·5-in. Q.F., 4 3·9-in., 2 2·7-in., 4 2·2-in., 6 M.	6	20·0	1200	535
br.	**Numancia**	I.	7305	314	10	55	9	25	3	1	3708	La Seyne	1863 1897	315,600	5½	5	..	8 10-in. M.L.R. (Armstrong), 6 6·2-in. Q.F., 6 4·7 in. (Hontoria), 8 M., 3 l.	2	8·0	1100	600
b.	**Pelayo**	S.	9900	330	0	66	0	24	11	2	9000 Nic.	La Seyne	1887 1897	..	17¾	19¼	4	2 12·5-in. 48-ton, 2 11-in. 38-ton, 9 5·5-in. Q.F., 6 smaller, 12 M.	7	16·0	800	600
a.c.b.	**Princesa de Asturias**	S.	7000	347	10	61	0	21	10	2	15,000	Carraca	1896	600,000	12	10½	2	2 11-in., 10 5·5-in. Q.F., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	5	20·0	1200	500
c.s., t.	**Puig-cerda**. (Monitor) (torpedo training)	I.	553	127	11	29	6	6	7	2	328	La Seyne	1874	..	4	4	9	1 6·2-in. (Palliser), 2 4·7-in. bronze smooth bores.	..	8·0	23	..
br.	**Vitoria** (training) *	I.	7250	318	3	55	10	25	3	1	4500	Blackwall	1865	..	5½	5	..	8 9-in. M.L.R. (Armstrong), 3 8-in., 1 7·8-in. (Hontoria), 8 M., 2 l.	2	11·0	875	561

* Furnished with fighting-masts and 5·5-in. Q.-F. guns at La Seyne.

SPAIN.—Cruising Ships.

Class.	NAME.	Material.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£		ins.			knots.	tons.	
cr.	**Alfonso XII.**	S.	3090	278	10	42	7	16	5	1	4800	Ferrol	1887	..	..	..	6 6·2-in. (Hontoria), 2 2·7-in. 6 6-pr. Q.F., 4 3-pr., 5 M.	5	17·5	600	300
cr.	**Alfonso XIII.**	S.	5000	318	6	50	6	20	0	2	11,000	Ferrol	1891	..	..	4½	4 7·8-in. (Hontoria), 6 4·7-in., 6 2·2-in. Q.F., 6 1·4-in., 3 M.	5	20·0	1200	276
cr.	**Aragon**	W.	3342	246	0	45	11	20	11	1	4400	Cartagena	1879	..	..	..	6 6·2-in. (Hontoria), 2 3·3-in. (Krupp), 4 2·9-in., 2 M.	2	14·0	470	300
g.b.	**General Concha**	I.	524	157	5	25	7	8	7	2	600	Ferrol	1883	..	..	..	3 4·7-in. (Hontoria), 2 Q.F., 1 M.	1	11·5	80	93
cr.	**Conde de Venadito**	I.	1130	210	0	32	0	12	6	1	1600	Cartagena	1888	..	..	..	4 4·7-in. (Hontoria), 2 2·7-in., 2 Q.F., 5 M.	2	14·0	220	130
to.g.b.	**Don Alvaro de Bazan**	S.	823	233	0	26	9	22	0	2	4600	Ferrol	1897	..	..	..	2 4·7-in. (Hontoria) Q.F., 4 1·6-in., 2 M.	4	20 0	..	110
to.g.b.	**Doña Maria de Molina**	S.	823	233	0	26	9	22	0	2	4600	Ferrol	1896	..	..	..	2 4·7-in. (Hontoria), Q.F., 4 1·6-in., 2 M.	4	20·0	..	110
to.g.b.	**Destructor**	S.	458	192	6	25	0	7	0	2	3800	Clydebank	1887	..	..	..	1 3·5-in., 4 6-pr. Q.F., 4 M.	3	22·56	104	55
cr.	**Estremadura**	S.	2030	290	0	36	0	14	0	2	7000 T	Cadiz	1900	..	..	2	4 5·9-in. Q.F., 4 4·2-in., 4 2·2-in., 2 M.	..	20·0	..	..
d.v.	**Fernando el Catolico** (Torpedo training)	I.	500	157	5	25	7	8	5	2	550	La Seyne	1875	..	..	..	1 6·2-in. M.L.R. (Palliser), 2 4·7-in., smooth-bores, 1 M.	..	10·0	20	98
to.g.b.	**Filipinas**	S.	750	213	0	27	0	8	6	2	4600	Cadiz	1892	..	..	..	2 4·7-in. Q.F., 4 1·5-in., 4 M.	4 sub.	20·0	120	110
to.g.b.	**Galicia**	S.	571	190	0	23	0	10	4	2	2600	Le Graña	1891	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	19·0	106	80

SPAIN.—Cruising Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons	ft.	in.	ft.	in.	ft.	in.	no.				£	ins.	ins.			knots.	tons.	
g. v.	**General Lezo**	I.	524	157	5	25	7	8	6	2	600	Carthagena	1885	..	..	..	2 4·7-in. (Hontoria), 1 3·5-in., 2 Q.F., 1 M.	2	11·0	80	97
cr.	**Infanta Isabel**	I.	1130	210	11	32	2	12	5	1	1500	Cadiz	1885	..	..	..	4 4·7-in. (Hontoria) 2 2·7-in., 3 Q.F., 4 M.	2	14·0	220	130
cr.	**Isabel II.**	I.	1130	210	11	32	2	12	5	1	1500	Ferrol	1886	..	..	..	4 4·7-in. (Hontoria), 2 7·7-in., 4 Q.F., 3 M.	2	14·0	220	130
cr.	**Isabel la Catolica**	S.	3500	..		..		..		..	..	Carraca	Bldg.	..	..	..	.. .. ..	..	..	..	..
cr.	**Lepanto**	S.	4826	318	6	50	6	20	0	2	12,000	Carthagena	1892	..	..	4½	4 7·8-in. (Hontoria), 6 4·7-in. Q.F., 6 6-pr., 4 3-pr. 5 M.	5	20·0	1100	276
g.v.	**Magellanes**	I.	524	157	5	25	7	8	6	2	600	Cadiz	1885	..	..	..	3 4·7-in. (Hontoria), 3 M.	1	11·0	80	97
to.g.b.	**Marques de la Victoria**	S.	823	233	0	26	9	22	0	2	4600	Ferrol	1897	..	..	..	2 4·7-in. (Hontoria) Q.F., 4 1·6-in., 2 M.	4	20·0	..	110
cr.	**Marques de la Enseñada**	S.	1030	185	0	30	0	11	6	2	1600	Carraca	1890	..	..	2½	4 4·7-in (Hontoria), 5 Q.F., 4 M.	4	15·0	160	164
d.v.	**Marques del Duero**	I.	500	157	5	25	7	8	5	2	550	La Seyne	1875	..		..	1 6·2-in. M.L.R. (Palliser), 2 4·7-in. smooth-bores, 1 M.	..	10·0	90	98
to.g.b.	**Marques de Molins**	S.	571	190	0	23	0	10	4	2	2600	La Graña	1891	..	..	..	2 4·7in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	19·0	106	80
”	**Martin Alonzo Pinzon**	S.	571	190	0	23	0	10	4	2	2600	La Graña	1892	..							
cr.	**Navarra**	W.	3342	232	11	42	7	20	4	1	4400 Nic.	Ferrol	1881	..	..	..	4 5 9-in., 2 4·7-in., 2 3·4-in., 4 2·9-in., 4 M.	2	14·0	470	300

cr.	**Nueva España**	S.	630	190	0	23	0	11	9	2	2600	Carraca	1889	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F.,	2	18·0	106	91
to.g.b.	**Rapido**	S.	570	190	0	23	0	10	4	2	2600	Carraca	1891	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	18·0	106	80
cr.	**Reina Regente**	S.	5000	..	..		..			..	..	Ferrol	Bldg.	..	..	..	..	..	20·0	..	..
„	**Rio de la Plata**	S. shd.	1800	246	0	35	4	15	0	2	7100	Havre	1898	..	..	1	2 5·5-in. Q.F., 4 3·9-in., 4 2·2-in., 6 M.	2	20·0	270	..
to.g.b.	**Temerario**	S.	570	190	0	23	0	10	4	2	2600	..	1889	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	20·5	106	82
„	**Veloz**	S.	750	213	0	27	0	8	6	2	4500	..	Bldg.	..	..	..	2 5·9-in. (Hontoria), 4 2·2-in. Q.F., 4 M.	2	20·0	106	..
„	**Vincente Yanez Pinzon**	S.	571	190	0	23	0	10	4	2	2600	La Graña	1891	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	19·0	106	80

In the war with the United States a number of Spanish gunboats, including nearly all of the first class, were captured (see the United States Tables), while many were destroyed, and after the war many gunboats were sold to the United States Government. The cruisers lost at Manila and Santiago have been removed from the list.

Cadiz.

SWEDEN.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Backing, Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
c.d.s., t.	**A. B. C.**	S.	3670	287	0	49	3	16	5	2	6000 Y.	Stockholm, Gothenborg, Malmö	Bldg.	..	$7\frac{7}{8}$	$5\frac{3}{4}$–$7\frac{7}{8}$	$1\frac{7}{8}$	2 8·2-in., 6 5·9-in. Q.F., 10 2·2-in., 2 1·4-in., 2 M.	2 sub.	16·5	300	..
a.g.b	**Berserk**	I.	460	130	3	26	3	8	3	2	155	Norrköping	1874	..	3	$16\frac{1}{2}$	$\frac{3}{4}$	1 4·7-in. Q.F., 2 2·2-in.	..	8·0	19	45
”	**Björn**	I.	460	130	3	26	3	8	3	2	155	Norrköping	1874	..	$3\frac{3}{4}$	$16\frac{1}{2}$	$\frac{3}{4}$	1 9·4-in., 2 M.	..	8·0	19	45
c.d.s., t.	**Dristigheten**	S.	3500	285	1	48	7	16	1	2	6000 Y.	Gothenborg	1900	..	$7\frac{7}{8}$ N.S.	$5\frac{3}{4}$–$7\frac{7}{8}$ N.S.	$1\frac{7}{8}$	2 8·2-in., 6 5·9-in. Q.F., 10 2·2-in., 2 M.	2 sub.	16·5	300	..
”	**Folke**	I.	460	130	3	26	3	8	3	2	155	Norrköping	1875	..	3	$16\frac{1}{2}$	$\frac{3}{4}$	1 9·4-in., 2 M.	..	8·0	19	45
”	**Gerda**	I.	460	130	3	26	3	8	3	2	133	Stockholm	1873	.	3	$16\frac{1}{2}$	$\frac{3}{4}$	1 9·4-in., 2 M.	..	7·6	19	45
c.d.s., t.	**Göta***	S.	3290	258	6	47	11	16	9	2	4750	Gothenborg	1890	.	$11\frac{9}{16}$–$7\frac{13}{16}$	$11\frac{5}{8}$–$9\frac{5}{8}$	2	2 10-in., 4 6-in., 5 2·2 Q.F., 8 M.	3	16·0	240	150
a.g.b.	**Hildur**	I.	460	130	3	26	3	8	3	2	133	Stockholm	1872	..	3	$16\frac{1}{2}$	$\frac{3}{4}$	1 9·4-in., 2 M.	..	7·6	19	45
c.d.s., t.	**John Ericsson**	I.	1500	199	10	45	3	12	2	1	380	Norrköping	1865	..	$4\frac{7}{8}$	$10\frac{5}{8}$	$1\frac{11}{16}$	2 6-in., 2 2·2-in. Q.F., 2 M.	..	7·5	112	80
”	**Loke**	I.	1600	204	9	44	11	11	10	1	430	Norrköping	1871	..	$4\frac{7}{8}$	$17\frac{5}{8}$	1	2 9·4-in., 2 M.	..	8·5	112	75
”	**Njord**	S.	3500	278	3	48	7	17	5	2	5350	Gothenborg	1898	..	9·5	$7\frac{7}{8}$	$1\frac{7}{8}$	2 9·8-in., 6 4·7-in. Q.F., 10 2·2-in., 4 M.	1	16·5	275	200
”	**Oden**	S.	3500	278	3	48	7	17	6	2	5330	Stockholm	1896	..	9·5	$9\frac{7}{8}$–$7\frac{7}{8}$	$1\frac{7}{8}$	2 9·8-in., 4 4·7-in. Q.F., 10 2·2-in., 4 M.	1	16·5	275	200
a.g.b.	**Sölve**	I.	460	130	3	26	3	8	3	2	155	Norrköping	1875	..	3	$16\frac{1}{2}$	$\frac{3}{4}$	1 9·4-in., 2 M.	..	8·0	19	45
c.d.s., t.	**Svea***	S.	3100	248	4	49	3	17	1	2	3640	Gothenborg	1886	..	$11\frac{1}{2}$–$7\frac{3}{4}$	$11\frac{1}{2}$–$9\frac{1}{2}$	$1\frac{15}{16}$	2 10-in. (Armstrong), 4 4·7-in., 6 2·2-in., 8 M.	1	14·7	220	268
”	**Thor**	S.	3500	278	3	48	7	17	6	2	5350	Stockholm	1898	..	9·5	$7\frac{7}{8}$	$1\frac{7}{8}$	2 9·8-in., 6 4·7-in. Q.F., 10 2·2-in., 4 M.	1	16·5	275	200
t.	**Thordön***	I.	1500	199	10	45	3	11	10	1	380	Norrköping	1866	..	$4\frac{5}{8}$	$10\frac{1}{4}$	1	2 9·4-in., 2 M.	..	6·7	112	80
c.d.s., t.	**Thule***	S.	3300	260	10	47	11	16	9	2	4740	Stockholm	1892	..	$11\frac{1}{2}$–$7\frac{3}{4}$	$11\frac{1}{2}$–$9\frac{1}{2}$	$1\frac{7}{8}$	2 10-in. (Armstrong), 4 6-in., 5 2·2 Q.F., 8 M.	2	16·2	250	165
”	**Tirfing***	I.	1500	199	10	45	3	11	10	1	380	Norrköping	1867	..	$4\frac{5}{8}$	$10\frac{1}{4}$	1	2 9·4-in., 2 M.	..	6·8	112	80
a.g.b.	**Ulf**	I.	460	130	3	26	3	8	3	2	155	Norrköping	1873	..	$3\frac{3}{4}$	$16\frac{1}{2}$	$\frac{3}{4}$	1 4·7-in. Q.F., 2 2·2-in. Q.F.	..	8·0	20	45

* In course of reconstruction.

SWEDEN.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.									knots.	tons.	
corv.	**Balder**	W.	1886	202	9	36	5	18	4	1	1380	Carlskrona	1870	..	..	..	1 6-in. (Armstrong), 8 4·7-in., 2 1·5-in., 1 2·5-in., 5 M.	..	12·1	200	218
g.v.	**Blenda**	I.	500	167	8	25	11	9	10	2	590	Gothenburg	1874	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	11·5	98	71
to.g.b. to.g.b.	**Psilander** **Claes Uggla**	S.	800	232	0	27	3	8	10	2	4500 Y.	Stockholm	Bldg.	..	..	..	2 4·7-in. Q.F., 4 2·2-in.	1 (sub.)	20·5	..	..
g.v.	**Disa**	I.	500	167	8	25	11	9	2	2	590	Carlskrona	1877	..	..	..	1 6-in., 1 4·7-in., 2 2·2., 2 M.	..	11·6	98	72
tor. ship.	**Drott** (ex Ran)	I.	630	175	2	25	11	9	10	2	960	Stockholm	1877	..	..	..	4 Engström, Q.F.	1	13·0	100	..
g.v.	**Edda**	I.	640	183	9	26	11	10	2	2	960	Carlskrona	1885	..	..	..	1 10·6-in., 1 6-in., 2 1·5., 2 M.	..	13·6	80	76
corv.	**Freja**	S.&W.	2000	215	11	40	0	19	8	1	1750	Malmö	1885	..	..	..	4 6-in., 8 4·7-in., 4 1·5-in., 2 2·5-in., 5 M.	..	14·1	180	250
to.g.b.	**Jacob Bagge**										3970	Malmö	1898						19·5		
„	**Örnen**	S.	800	222	1	26	11	10	2	2	4100	Gothenburg	1896	..	..	..	2 4·7-in. Q.F., 4 2·2-in.	1 (sub.)	19·5	..	..
„	**Claes Horn**										3600	Stockholm	1899						20·0		
g.v.	**Rota**	I.	536	171	3	25	3	10	10	2	780	Stockholm	1878	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	13·0	80	72
corv.	**Saga**	W.	1530	200	6	34	5	17	1	1	900	Carlskrona	1878	..	..	..	1 6-in. (Armstrong), 6 4·7-in., 1 M., 3 l.	..	11·2	170	189
g.v.	**Skäggald**	I.	536	171	3	25	11	9	10	2	780	Stockholm	1879	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	13·2	80	72
„	**Skagul**	I.	536	171	7	25	7	10	2	2	780	Stockholm	1878	..	..	..	1 6-in., 1 4·7-in., 2 2·2-in., 2 M.	..	13·1	80	72
„	**Skuld**	I.	536	171	3	25	3	10	10	2	780	Carlskrona	1879	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	13·0	80	72
„	**Urd**	I.	536	172	3	25	7	10	6	2	780	Malmö	1877	..	..	..	1 6-in., 1 4·7-in., 2 2·2 Q.F., 2 M.	..	13·5	80	71
„	**Verdande**	I.	536	171	7	25	7	10	2	2	780	Carlskrona	1879	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	13·2	80	72
cr.	New Ship	S.	..	..		..		..		..	12000 Y.	..	Pro.	..	..	..	. . . . . .	..	..	..	..

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in B.L.R. and 2 M.; also one vessel of 280 tons and 440 H.P., armed with 4 quick-firing guns —the Svenskund, used as a mining and torpedo-ship and ice-breaker.

TURKEY.—Armoured Ships.

A number of ships have been struck out of these lists owing to information obtained from Constantinople. Of the remainder few have any fighting value.

Class.	NAME.	Material.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply	Complement.
															Belt.	Gun Position	Deck.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.	no.					inches.	inches.	inches.			knots.	tons.	
c.	Assar-i-Shefket	I.	2080	203	5	42	7	16	5	2	1750	La Seyne	1868	..	6	5	..	1 9-in. (Armstrong), 4 7-in., 4 M., 4 l.	..	11·0	375	220
c.b.	Assar-i-Tewfik	I.	4687	272	4	52	6	24	11	1	3560	La Seyne	1868	..	8	6	..	2 9·2-in., 6 6-in. Q.F., 10 12-pr., 12 6-pr.*	..	13·0	400	..
c.	Avni-Illah	I.	2400	226	4	36	0	16	5	1	2200	Thames	1869	..	6	6	1½	4 9-in. M.L.R. (Armstrong), 4 M., 4 l.	1	12·0	220	225
b.	Azizieh	I.	6400	292	0	55	9	25	7	1	3735	Clyde	1864	..	5½	4½	..	2 9·2-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	13·0	750	600
c.b.	Feth-i-Bulend	I.	2806	236	3	39	4	18	1	1	3250	Thames	1869	..	9	9	5	4 9-in. M.L.R. (Armstrong), 4 M., 4 l.	1	13·0	300	250
a.g.b.	Feth-el-Islam	I.	335	101	9	24	7	5	11	1	290	Gironde	1864	..	3	3	..	2 7-in. (Armstrong), 2 l.	..	8·0	20	..
c.b.	Hamidieh	I.	6700	292	0	55	9	24	10	1	4500	Turkey	1885	..	9	5	3	10 10·2-in. (Krupp), 2 6·6-in., 6 l., 2 M.	2	13·0	600	..
b.	Mahmoudieh	I.	6400	292	0	55	9	25	7	1	3735	Thames	1864	..	5½	4½	..	2 9·2-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	12·0	750	600
c.b.	Messoudieh	I.	9120	331	5	59	0	25	11	2	11,000 Nic.	Thames Sestri Ponente	1874 1901	..	12	6-9	1	2 9·2-in., 12 6-in. Q.F., 14 3-in., 10 6-pr., 2 3-pr.*	..	15·0	600	..
„	Muin-i-Zaffer	I.	2400	230	0	36	0	16	5	2	2200	Thames	1869	..	6	6	1½	4 10-in. M.L.R. (Armstrong), 1 4·7-in. (Krupp), 4 M., 4 l.	1	12·0	220	..
„	Mukadim-i-Hair	I.	2806	236	3	39	4	18	1	1	3000	Turkey	1872	..	9	9	5	4 10-in. M.L.R. (Armstrong), 1 4·7-in. (Krupp), 4 M., 4 l.	1	12·0	300	250
„	Nedjim-i-Schefket	I.	2050	203	5	42	7	16	5	2	1900	La Seyne	1868	..	6	5	..	1 9-in., 4 7-in. (Armstrong), 4 M., 4 l.	1	11·0	300	220
b.	Orkanieh	I.	6400	292	0	55	9	25	7	1	3735	Clyde	1865	..	5½	4½	..	2 9·2-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	12·0	750	600
„	Osmanieh	I.	6400	292	0	55	9	25	7	1	3735	Clyde	1864	..	5½	4½	..	2 9·2-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	12·0	750	600

* The Assar-i-Tewfik and Messoudieh are now at Genoa, and the latter is in hand at Messrs. Ansaldo's yard, receiving the new armament and machinery indicated. The hull has been partially rebuilt to suit the new armament, and Messrs. Ansaldo have built the engines. Nothing has as yet been decided in regard to the Assar-i-Tewfik.

TURKEY.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	ed Horse-power.	Where Built.	Cost.	Date of Launch.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.				£		in.	in.			knots.	tons.	
cr.	Fezibahri	S.	1815	226	0	35	0	14	0	2	2500	Turkey	..	Bldg.	..	½	6 6-in. (Krupp)	7	17·0	..	..
„	Heibetnuma	S. & W.	1960	226	0	37	0	14	0	1	2500 ind.	Turkey	..	1890	..	..	3 6·6-in. (Krupp), 6 4·7-in., 6 Q.F.	2	14·0	..	..
„	Hundavendikiar	S.	4050	279	0	49	3	21	0	2	..	Turkey	..	Bldg.	..	2	2 8·9-in. (Krupp), 6 5·9-in., 4 3·9-in.	5	..	..	300
g.v.	Lutfi-hamayoun	C.	1813	210	0	35	0	14	0	1	2800	Turkey	..	1892	..	..	4 6-in. (Krupp), 6 4·7-in. 6 Q.F.	2	18·0	..	..
to. g.b.	Namet	S.	900	230	0	31	0	16	6	2	4500	Gaarden	..	1890	¼	..	2 4-in. (Krupp), 16 M.	2	19·0	..	111
„	Pelenk-i-deria	S.	840	236	3	31	0	16	6	2	5000	Gaarden	..	1890	¼	..	2 4-in. (Krupp), 16 M.	2	20·0	..	111
g.v.	Sedul Bahr	W.	800	173	6	26	7	11	6	1	160	Turkey	..	1894	..	2	4 4·7-in. (Krupp), 6 M.	2	12·7	120	..
cr.	Selimieh	S.	4050	279	0	49	3	21	0	2	..	Turkey	..	Bldg.	..	½	2 8·2-in. (Krupp), 6 5·9-in., 4-in., 6 M.	..	..	..	300
„	Shadie	S.	1815	226	0	35	0	14	0	2	2500	Turkey	..	Bldg.	..	..	6 5·9-in. (Krupp)	7	17·0	..	..
to. g.b.	Shahani-deria	S.	450	200	0	23	0	9	0	2	3000	Turkey	..	1892	..	..	2 4·7-in. Q.F. (Krupp), M.	4	22·0	..	..
g.v.	Zuhaf	W.	800	173	6	26	7	11	6	1	160	Turkey	..	1894	..	..	4 4·7-in. (Krupp), 6 M.	2	12·7	120	..

UNITED STATES.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Torpedo Tubes.	Speed.	Normal *Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
t.	**Alabama**	S.	11,565	368	0	72	3	24	9	2	11,366	Philadelphia	1898	544,539	9½–16½	10–15	2¾–4	4 13-in., 14 6-in. Q.F., 16 6-pr., 6 1-pr., 4 M., 2 l.	4	17·1	800 / 1200	536
c.d.s., t. (2 t.)	**Amphitrite**	I.	3990	259	6	55	6	14	8	2	1600	Wilmington	1883 reblt.	..	5–9	7½–11½	1¾	4 10-in., 2 4-in. Q.F., 2 6-pr., 2 3-pr., 7 1-pr., 3 M., 1 l.	..	10·5	250	182
c.d.s., t. (1 t.)	**Arkansas**	S.	3235	252	0	50	0	12	6	2	2400 T.	Newport News	1900	197,267	11	10–11	1½	2 12-in., 4 4-in. Q.F., 3 6-pr., 6 1-pr., 2 M.	..	11·5	400	131
a. c.	**Brooklyn**	S.	9215	400	6	64	8	26	2	2	18,769	Philadelphia	1895	613,583	3 H.S.	5½–8 H.S.	6–3	8 8-in., 12 5-in. Q.F., 12 6-pr., 4 1-pr., 4 M., 2 l.	4	21·9	900 / 1461	517
a.c.	**California**	S.	13,680	502	0	69	6	24	6	2	23,000 W.T.	S. Francisco	Bldg.	756,000	5–6	6	4	4 8-in., 14 6-in. Q.F., 18 3-in., 12 3-pr., 8 1-pr., 6 M., 2 l.	2 sub.	22·0	900 / 2000	822
c.d.s., t. (1 t.)	**Canonicus**	I.	2100	225	0	43	8	13	9	1	340 B.&W.	Boston	1864	128,011	5	10	..	2 15-in. smooth-bores, 2 12-pr. H.	..	6·0	160	106
c.d.s., t. (1 t.)	**Catskill**	I.	1875	200	0	46	0	11	9	1	340	Brooklyn	1863	87,900	5	11	..	2 15-in. smooth-bores	..	6·0	150	105
a. c.	**Charleston**	S.	9,700	424	0	66	0	25	6	2	21,000 W.T.	Newport News	Bldg.	..	4	4	3	14 6-in. Q.F., 18 14-pr., 12 3-pr., 8 1-pr., 4 M.	..	22·0	650 / 1500	
a. c.	**Colorado**	S.	13,680	502	0	69	6	..		2	23,000 W.T.	Philadelphia	Bldg.	756,000	5–6	6	4	4 8-in., 14 6-in. Q.F., 18 3-in., 12 3-pr., 8 1-pr., 6 M., 2 l.	2 sub.	22·0	900 / 2000	822
c.d.s., t. (1 t.)	**Florida**	S.	3235	252	0	50	0	12	6	2	2400 Nor.	Elizabeth-port	Bldg.	190,075	11	10–11	1½	2 12-in., 4 4-in. Q.F., 3 6-pr., 6 1-pr., 2 M.	..	11·5	400	131
Super-posed turrets.	**Georgia**	S.	14,948	435	0	76	3	..		2	19,000 W. T.	Bath, Me.	Bldg.	..	8–11 K.S.	6–11 K.S.	3	4 12-in., 8 8-in., 12 6-in. Q.F., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 sub.	19·0	900 / 1900	695
t.	**Illinois**	S.	11,565	368	0	72	3	24	9	2	10,000	Newport News	1898	533,237	9½–16½	10–15	2¾–4	4 13-in., 14 6-in. Q.F., 16 6-pr., 6 1-pr., 4 M., 2 l.	4	16·0	800 / 1200	536
b.	**Indiana**	S.	10,288	348	0	69	3	27	2	2	9,738	Philadelphia	1893	620,569	18 H.S.	6–17 H.S.	2¾	4 13-in., 8 8-in., 4 6-in. Q.F., 20 6-pr. Q.F., 6 1-pr., 2 l.	2	15·5	400 / 1597	497

b.	**Iowa**	S.	11,340	360	0 72	3 26	10	2	12,105	Philadelphia	1896	618,514	5–14 H. S.	7–15	2¾	4 12-in., 8 8-in., 6 4-in. Q.F., 20 6-pr., 4 1-pr., 4 M., 2 l.	4	17·1	625 / 1795	510
c.d.s., t. (1 t.)	**Jason**	I.	1875	200	0 46	0 11	6	1	340	Chester	1864	86,872	5	11	..	2 15-in. smooth-bores, 2 12-pr. H.	..	6·0	150	105
ram	**Katahdin**	S.	2155	250	9 43	5 16	0	2	5,068	Bath, Me.	1893	191,102	3–6	18	2–6	4 6-pr. Q.F.	..	16·1	175 / 192	97
super-posed turrets	**Kearsarge** / **Kentucky**	S.	11,525	368	0 72	2 25	10	2	11,954 / 12,318	Newport News.	1898	462,345 each	9½–16½ H. S.	9–17 H. S.	2¾–5	4 13-in., 4 8-in., 14 5-in. Q.F., 20 6-pr., 8 1-pr., 4 M., 2 l.	4	16·8	410 / 1591	586 / 589
c.d s., t. (1 t.)	**Lehigh**	I.	1875	200	0 46	0 11	9	1	340	Chester	1864	86,864	5	11	..	2 15-in. smooth-bores, 2 12-pr. H.	..	6·0	150	105
c.d.s., t. (1 t.)	**Mahopac**	I.	2100	225	0 43	8 13	9	1	340 B.&W.	Jersey City	1865	130,560	5	10	..	2 15-in. smooth-bores, 2 12-pr. H.	..	6·0	160	105
t.	**Maine**	S.	12,300	388	0·72	2 25	6	2	16,000 (Nic.)	Philadelphia	Bldg.	592,828	7½–11 K. S.	9–12 K. S.	2¾–4	4 12-in., 16 6-in. Q.F., 6 3-in., 8 6-pr., 6 1-pr., 2 M., 1 l.	2 sub.	18·0	1000 / 2000	551
c.d.s., t. (1 t.)	**Manhattan**	I.	2100	225	0 43	8 13	9	1	340 B.&W.	Jersey City	1865	129,247	5	10	..	2 15-in. smooth-bores, 2 12-pr. H.	..	6·0	160	105
a.c.	**Maryland**	S.	13,680	502	0 69	6	..	2	23,000 W.T.	Newport News.	Bldg.	756,400	5–6	6	4	4 8-in., 14 6-in. Q.F., 18 3-in., 12 3-pr., 8 1-pr., 6 M., 2 l.	2 sub.	22·0	900 / 2000	822
b.	**Massachusetts**	S.	10,288	348	0 69	3 27	2	2	10,415	Philadelphia	1893	620,569	18 H. S.	6–17 H. S.	2¾	4 13-in., 8 8-in., 4 6-in. Q.F., 20 6-pr., 8 1-pr., 2 M.	2	16·2	400 / 1597	495
c.d.s., t. (2 t.)	**Miantonomoh**	I.	4005	259	6 55	6 15	0	2	1,426	Chester	1876 reblt.	..	7	11½	1¾	4 10-in., 2 6-pr. Q.F., 2 3-pr., 6 1-pr., 1 M., 1 l.	..	10·5	250	149
a.c.	**Milwaukee**	S.	9,700	424	0 63	0 25	6	2	21,000 W.T.	..	Pro.	..	4	4	3	14 6-in. Q.F., 18 14-pr., 12 3-pr., 8 1-pr., 4 M.	..	22 0	650 / 1500	
t.	**Missouri**	S.	12,230	388	0 72	3 25	6	2	16,000 T.	Newport News	Bldg.	592,828	8½–12 K. S.	9–12 K. S.	2¾–4	4 12-in., 16 6-in. Q.F., 6 3-in., 8 6-pr., 6 1-pr., 2 M., 2 l.	2 sub.	18·0	1000 / 2000	551
c.d.s., t. (2 t.)	**Monadnock**	I.	3990	259	6 55	6 14	7	2	3,000	Vallejo, Cal.	1883 reblt.	..	5–9	7½–11½	1¾	4 10-in., 2 4-in. Q.F., 2 6-pr., 2 3-pr., 2 1·4-in., 2 1-pr., 2 M., 1 l.	..	12·0	250 / 386	213
c.d.s., t. (1 t.)	**Montauk**	I.	1875	200	0 46	0 11	9	1	340	Brooklyn	1864	86,903	5	11	..	2 15-in. smooth-bores, 2 12-pr. H.	..	5·5	160	105
c.d.s., t.	**Monterey**	S.	4084	256	0 59	0 15	4	2	5244	S. Francisco.	1891	345,731	6–13	7½–13	3	2 12-in., 2 10-in., 6 6-pr., 4 1-pr., 2 M., 1 l.	..	13·6	200 / 233	218
c.d.s., t. (1 t.)	**Nahant**	I.	1875	200	0 46	0 11	6	1	340	Boston.	1863	84,910	5	11	..	2 15-in. smooth-bores, 2 12-pr. H.	..	6·0	160	105
Super-posed turrets.	**Nebraska**	S.	14,948	435	0 76	3	..	2	19,000 W. T.	Seattle.	Bldg.	..	8–11 K.S.	6–11 K.S.	3	4 12-in., 8 8-in., 12 6-in. Q.F., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 sub.	19·0	900 / 1900	695
c.d.s., t. (1 t.)	**Nevada**	S.	3235	252	0 50	0 12	6	2	2,400 Nic.	Bath, Me.	1900	197,267	11	10–11	1½	2 12-in., 4 4-in. Q.F., 3 6-pr., 6 1-pr., 2 M.	..	11·5	400	131

* The figures below the line in this column are bunker capacity; the draught given is the maximum with bunkers full, the displacement is with all stores on board and normal coal supply; I.H.P. and speed are on trial for completed vessels.

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in	ft.	in.	ft.	in.	no				£	in.	in.	in.			knots.	tons.	
Superposed turrets.	**New Jersey**	S.	14,948	435	0	76	3	..		2	19,000 W.T.	Fore River	Bldg.	..	8–11 K. S.	6–11 K. S.	3	4 12-in., 8 8-in., 12 6-in. Q.F., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 sub.	19·0	900 1900	695
a.c.	**New York**	S.	8200	380	6	64	10	26	8	2	17,401	Philadelphia	1891	613,377	4	5½–10	6–3	6 8-in., 12 4-in. Q.F., 8 6-pr., 2 1-pr., 2 M.	2	21·0	750 1290	562
t.	**Ohio**	S.	12,440	388	0	72	3	25	6	2	16,000 T.	S. Francisco.	Bldg.	595,705	7–11 K. S.	8–12 K. S.	3–4	4 12-in., 16 6-in. Q.F., 6 3-in., 8 6-pr., 6 1-pr., 2 M., 2 l.	2 sub.	18·0	1000 2000	521
b.	**Oregon**	S.	10,288	348	0	69	3	27	2	2	11,111	S. Francisco.	1893	653,447	18 H. S.	6–17 H. S.	2¾	4 13-in., 8 8-in., 4 6-in. Q.F., 20 6-pr., 6 1-pr., 2 M., 2 l.	2	16·7	400 1594	494
a.c.	**Pennsylvania**	S.	13,680	502	0	69	6	24	6	2	23,000 W.T.	Philadelphia	Bldg.	756,000	5–6 K. S.	6 K. S.	4	4 8-in., 14 6-in. Q.F., 18 3-in., 12 3-pr., 8 1-pr., 6 M., 2 l.	2 sub.	22·0	900 2000	822
c.d.s., t. (2 t.)	**Puritan**	I.	6060	290	3	60	1½	18	6	2	3,700	Chester	1882 reblt.	..	6–14	8–14	2	4 12-in., 6 4-in. Q.F., 6 6-pr., 2 1·4-in., 2 1-pr., 1 l.	..	12·4	307	230
Superposed turrets.	**Rhode Island**	S.	14,948	435	0	76	3	..		2	19,000 W.T.	Fore River	Bldg.	..	8–11 K. S.	6–11 K. S.	3	4 12-in., 8 8-in., 12 6-in. Q.F., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 sub.	19·0	900 1900	695
a.c.	**St. Louis**	S.	9,700	424	0	66	0	25	6	2	21,000 W.T.	Philadelphia (Neafie)	Bldg.	..	4 K. S.	4 K. S.	3	14 6-in. Q.F., 18 14-pr., 12 3-pr., 8 1-pr., 4 M.	..	22·0	650 1500	
a.c.	**South Dakota**	S.	13,680	502	0	69	6	..		2	23,000 W.T.	S. Francisco.	Bldg.	756,000	5–6 K. S.	6 K. S.	4	4 8-in., 14 6-in. Q.F., 18 3-in., 12 3-pr., 8 1-pr., 6 M., 2 l.	2 sub.	22·0	900 2000	822
c.d.s., t. (2 t.)	**Terror**	I.	3990	259	6	55	6	15	4	2	1,600	Philadelphia	1883 reblt.	..	4–7	11½	1¾	4 10-in., 2 6-pr., 2 3-pr., 2 1·4-in., 1 l.	..	10·5	250 285	443
t.	**Texas**	S.	6315	301	4	64	1	25	3	2	8,610	Norfolk	1892	513,716	12	12	2	2 12-in., 6 6-in., 12 6-pr. Q.F., 10 1-pr., 2 M., 1 l.	2	17·8	500 850	177
Superposed turrets.	**Virginia**	S.	14,948	435	0	76	3	..		2	19,000 W.T.	Newport News	Bldg.	..	8–11 K. S.	6–11 K. S.	3	4 12-in., 8 8-in., 12 6-in. Q.F., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 sub.	19·0	900 1900	695
a.c.	**West Virginia**	S.	13,680	502	0	69	6	24	6	2	23,000 W.T.	Newport News	Bldg.	756,000	5–6 K. S.	6 K. S.	4	4 8-in., 14 6-in. Q.F., 18 3-in., 12 3-pr., 8 1-pr., 6 M., 2 l.	2 sub.	22·0	900 2000	822
t.	**Wisconsin**	S.	11,565	368	0	72	3	25	5	2	10,000	S. Francisco.	1898	549,666	9½–16½	10–15	3–4	4 13-in., 14 6-in. Q.F., 16 6-pr., 4 1-pr., 4 M., 2 l.	4	16·0	800 1200	531
c.d.s., t. (1 t.)	**Wyoming**	S.	3,235	252	0	50	0	12	6	2	2,400 B.&W.	S. Francisco.	1900	200,350	11	10–11	1½	2 12-in., 4 4-in. Q.F., 3 6-pr., 6 1-pr., 2 M.	..	11·5	400	131

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
cr.	Albany (ex Abreu)	S. sh.	3769	345	0	43	9	20	0	2	7400	Elswick	1899	247,611	..	3	6 6-in. Q.F., 4 4·7-in., 10 6-pr., 4 1-pr., 4 M., 2 l.	3	20·0	512/754	260
g.b.	Annapolis	S.	1000	168	0	36	0	12	7	1	1227 B.&W.	Elizabeth Pt.	1896	46,789	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M.	..	13·1 (t)	100/225	135
cr.	Atlanta	S.	3000	271	3	42	2	21	1	1	4030 B.&W.	Chester	1884	126,785	..	1½	2 8-in., 6 6-in. Q.F., 6 6-pr., 4 1-pr., 2 M., 1 l.	..	15·6	490	278
cr.	Baltimore	S.	4413	327	6	48	7	23	11	2	10,064	Philadelphia	1888	272,270	4½	4-2½	4 8-in., 6 6-in., 4 6-pr., 2 3-pr., 2 1-pr., 6 M., 1 l.	5	20·1	400/1143	386
g.v.	Bancroft	S.	839	187	6	32	0	12	11	2	1213	Elizabeth Pt.	1892	51,371	..	½	4 4-in. Q.F., 8 3-pr., 1 1-pr., 1 M.	1	14·37	100/136	195
g.v.	Bennington	S.	1710	230	0	36	0	16	7	2	3436	Chester	1890	100,894	..	½	6 6-in., 2 6-pr., 2 3-pr., 2 1-pr., 2 M.	..	17·5	200/403	195
cr.	Boston	S.	3000	271	3	42	2	21	1	1	4300	Chester	1884	127,196	..	1½	2 8-in., 6 6-in., 2 6-pr., 2 3-pr., 2 1-pr., 2 1·8-in., 2 1·4-in., 2 M., 1 l.	..	15·6	495	278
g.v.	Castine	S.	1177	204	0	32	1	14	4	2	2199	Bath, Me.	1892	65,450	..	½	8 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M., 1 l.	..	16·0	125/292	151
cr. cr.	Chattanooga Cleveland	S. shd.	3200	292	0	44	0	16	8	2	4700 W. T.	Elizabeth Pt., Bath, Me.	Bldg.	212,325	..	2	10 5-in. Q.F., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·5	470/700	293
cr.	Chicago	S.	4500	325	0	48	2	22	6	2	9000 C. & B &W.	Chester	1885	182,677	4	1½	4 8-in. Q.F., 14 5-in. Q.F., 7 6-pr., 2 1-pr., 2 M., 1 l.	..	18·0	831	409
cr.	Cincinnati	S.	3213	300	0	42	0	20	2	2	10,000	Brooklyn	1892	226,055	..	2½	1 6-in., 10 5-in. Q.F., 8 6-pr., 2 1-pr., 2 M., 1 l.	2	19·0	350/468	314
cr.	Columbia	S.	7375	412	0	58	2	25	7	3	18,509	Philadelphia	1892	559,950	4	4–2½	1 8-in., 2 6-in., 8 4-in. Q.F., 12 6-pr., 2 1-pr., 2 M., 1 l.	4	22·8 (t)	750/1670	477
g.v.	Concord	S.	1710	230	0	36	0	16	7	2	3405	Chester	1890	100,894	..	½	6 6-in., 2 6-pr. Q.F., 2 3-pr., 2 1·4-in., 2 M., 1 l.	..	16·8	200/401	194
cr.	Detroit	S.	2089	257	0	37	0	16	8	2	5227	Baltimore	1891	125,860	..	½	10 5-in. Q.F., 6 6-pr., 2 1-pr., 2 M., 1 l.	2	18·71	200/340	256

UNITED STATES.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
cr. cr.	**Denver** **Des Moines**	S. shd.	3200	292	0	44	0	16	8	2	4700 W.T.	Philadelphia, Weymouth, Mass.	Bldg.	212,325	..	2	10 5-in. Q.F., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·5	470 700	293
g.v.	**Dolphin**	S.	1486	240	0	32	0	17	1	1	2253	Chester	1884	64,728	..	..	3 4-in. Q.F., 2 14-pr., 2 6-pr., 2 3-pr., 2 M.	..	15·5	173	117
cr.	**Don Juan de Austria***	I.	1130	210	0	32	0	13	0	1	1600	Cartagena	1889	..	..	..	4 5-in. Q.F., 4 6-pr., 4 M.†	3	14·0	210	130
cr.	**Galveston**	S. shd.	3200	292	0	44	0	16	8	2	4700 W.T.	Richmond, Va.	Bldg.	212,325	..	2	10 5-in. Q.F., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·5	470 700	293
g.v.	**General Alava**	S.	1330	212	0	28	3	16	0	1	770	..	..	..	..	..	4 M.	..	10·5	..	..
g.v.	**Helena**	S.	1397	250	9	40	1	10	0	2	1988	Newport News	1896	57,536	1	½	8 4-in. Q.F., 4 6-pr., 4 1-pr., 2 M., 1 l.	..	15·5 (t)	100 300	256
c.r. c.r.	**Isla de Cuba** * **Isla de Luzon** *	S.	1125	192	0	30	0	12	4	2	1000	Elswick	1887	..	..	2½	4 4-in. Q.F., 4 6-pr., 4 M.†	3	14·0	160	160
g.v.	**Machias**	S.	1177	204	0	32	1	14	4	2	2046 Nor.	Bath, Me.	1891	65,450	..	½	8 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M., 1 l.	..	15·46	125 292	151
cr.	**Marblehead**	S.	2089	257	0	37	0	16	8	2	5451	Boston	1892	138,498	..	½	10 5-in. Q.F., 6 6-pr., 2 1-pr., 2 M., 1 l	2	18·4	200 340	248
g.b.	**Marietta**	S.	1000	174	0	34	0	13	5	2	1054 B.&W.	S. Francisco	1896	45,823	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M., 1 l.	..	13·2 (t)	120 2 6	140
cr.	**Minneapolis**	S.	7375	412	0	58	2	25	7	3	20,862	Philadelphia	1893	552,754	4	4–2½	1 8-in., 2 6-in., 8 4-in. Q.F., 12 6-pr., 2 1-pr., 2 M., 1 l.	4	23·0 (t)	750 1891	477
cr.	**Montgomery**	S.	2089	257	0	37	0	16	11	2	5580	Baltimore	1891	125,860	..	½	10 5-in. Q.F., 6 6-pr., 2 1-pr., 2 M., 1 l.	2	19·0	200 340	257
g.v.	**Nashville**	S.	1371	220	0	38	1	12	0	2	2536 Y.	Newport News	1895	57,536	..	½	8 4-in. Q.F., 4 6-pr., 2 1-pr., 2 M., 1 l.	1	16·7 (t)	150 400	176
cr.	**Newark**	S.	4098	311	7	49	2	22	7	2	8869	Philadelphia	1890	256,437	3	3–2	12 6-in. Q.F., 8 6-pr., 4 1-pr., 2 M., 1 l.	..	19·0	400 809	384
g.b.	**Newport**	S.	1100	168	0	36	0	13	0	1	1008	Bath, Me.	1896	..	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M.	..	12·2	100 230	147

cr.	**New Orleans** (ex Amazonas).	S. shd.	3769	346	0	43	9	19	9	2	7500	Elswick	1896	293,684	..	3–1¼	6 6-in. Q.F., 4 4·7-in., 10 6-pr., 4 3-pr., 4 M., 2 l.	..	20·0	700 / 800	407
g.b.	**Newport**	S.	1000	168	0	36	0	12	7	1	1008	Bath, Me.	1896	47,406	..	..	6 4-in. Q.F., 4 6-pr. 2 1-pr., 1 M.	..	12·3 (*t*)	100 / 239	135
cr.	**Olympia**	S.	5870	340	0	53	1	24	10	2	17,313	S. Francisco	1892	369,054	4½–3½	4–2½	4 8-in., 10 5-in. Q.F., 14 6-pr., 7 1-pr., 2 M., 1 l.	6	21·69	400 / 1169	450
g.v.	**Petrel**	S.	892	176	3	31	0	13	5	1	1095	Baltimore	1888	50,755	..	½	4 6-in., 2 3-pr., 2 1-pr., 2 1·4-in., 2 M.	..	11·8	100 / 200	122
cr.	**Philadelphia**	S.	4324	327	6	48	7	23	5	2	8815	Philadelphia	1889	277,405	..	4–2½	12 6-in., 4 6-pr., 4 1-pr., 2 M., 1 l.	..	19·68 (*t*)	400 / 1085	384
g.b.	**Princeton**	S.	1000	168	0	36	0	12	7	1	800	Camden	1897	47,262	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M.	..	12·0	100 / 238	135
cr.	**Raleigh**	S.	3213	300	0	42	0	20	2	2	10,000 B.&W.	Norfolk	1892	226,055	..	2½	1 6-in., 10 5-in. Q.F., 8 6-pr., 4 1-pr., 2 M., 1 l.	2	19·0	350 / 460	313
cr.	**Reina Mercedes**‡	S.	3090	279	10	43	3	19	6	1	3700	Ferrol	1887	..	..	..	6 6·2-in., 2 2·7-in., 3 2·2-in. Q.F.	5	17·5	600	370
cr.	**San Francisco**	S.	4098	310	0	49	2	22	3	2	9913	S. Francisco	1889	293,435	..	3–2	12 6-in. Q.F., 4 6-pr., 4 3-pr., 2 1-pr., 6 M., 1 l.	4	19·5	350 / 628	383
cr.	**Tacoma**	S. shd.	3200	292	0	44	0	16	8	2	4700 W. T.	S. Francisco	Bldg.	212,325	..	2	10 5-in. Q.F., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·5	470 / 700	293
g.v.	**Topeka**	I	1814	250	0	35	0		..	1	1095	Kiel	1881	..	..	..	6 4-in. Q.F., 6 3-pr., 2 1-pr., 1 M.	..	16·0	273 / 410	167
cr.	**Vesuvius** (Dynamite Gunboat)	S.	929	252	4	26	6	11	2	2	3795	Philadelphia	1888	71,963	..	¼	3 15-in. dynamite guns, 3 3-pr., 2 M.	..	21·4	152	69
g.v.	**Vicksburg**	S.	1000	168	0	36	0	12	7	1	1118	Bath, Me.	1896	47,406	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M.	..	12·7 (*t*)	100 / 239	135
g.v.	**Wheeling**	S.	1000	174	0	34	0	12	7	2	1081	S. Francisco	1897	65,540	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 M., 1 l.	..	12·9 (*t*)	120 / 226	140
g.v.	**Wilmington**	S.	1397	250	9	40	1	10	0	2	1894	Newport News	1895	57,536	1	¼	8 4-in. Q.F., 4 6-pr., 4 1-pr., 4 M., 1 l.	..	15·0 (*t*)	100 / 300	175
g.v.	**Yorktown**	S.	1710	230	0	36	0	16	7	2	3392	Philadelphia	1888	93,496	..	¼	6 5-in. Q.F., 2 6-pr. Q.F., 2 3-pr., 4 1-pr., 2 M., 1 l.	2	16·1	200 / 380	195

Also the sailing training ship Chesapeake (1175 tons), built at Bath, Me., and launched 1899.

* **Captured at Manila after the battle of May 1, 1898, and under repair at Hong Kong. The following gunboats were captured during the war with Spain, or subsequently purchased: Albay, Alvarado, Arayat, Bacolo, Basco, Belusan, Calamianes, Callao, El Cano, Guardoqui, Leyte, Manileño, Mariveles, Mindoro, Pampanga, Panay, Paragua, Quiros, Samar, Sandoval, Urdaneta, Villalobos.**

† New armament of the captured cruisers.

‡ **Sunk at the mouth of Santiago Harbour, July 5, 1898, and refloated by the Americans.**

Enrolled Auxiliary Cruisers of the United States Navy.

	Class.	NAME.	Material of Hull.	Gross Tonnage.	Length.	Beam.	Depth.	Propellers.	Indicated Horse-Power.	Where Built.	When Built.	Owners.	Armament, all Q.F.	Speed.
Atlantic Coast.	1st	**St. Louis**	S.	11,629	535 5	63 0	26 8	2	18,000	Philadelphia	1895	International Navigation Company.	8 5·5-in., 4 6-pr., 4 M.	22·2
	1st	**St. Paul**	S.	11,629	535 5	63 0	26 8	2	18,000	"	1895	"	8 5·5-in., 4 6-pr., 4 M.	22·5
	1st	**Paris.**	S.	10,794	517 0	63 3	22 0	2	20,000	Clydebank, Scotland	1889	"	12 5·5-in., 6 6-pr., 6 M.	20·7
	1st	**New York**	S.	10,802	517 0	63 3	22 0	2	20,000	"	1888	"	12 5·5-in., 6 6-pr., 6 M.	20·6
	3rd	**Newport**	I.	2735	326 0	38 2	23 9	1	..	Chester, Pa.	1880	Pacific Mail.	8 4-in., 8 M.	16·0
	3rd	**City of Para**	I.	3532	345 0	38 6	19 9	1	2250	"	1878	"	8 4-in., 8 M.	12·0
	3rd	**Caracas**	I.	2584	283 6	40 2	20 5	1	..	Philadelphia	1889	Red D Line.	8 4-in., 6 M.	13·0
	3rd	**Philadelphia**	I.	2520	300 0	35 0	20 6	1	..	"	1885	"	8 4-in., 6 M.	12·0
	3rd	**Venezuela**	I.	2843	303 6	40 2	20 5	1	..	"	1889	"	8 4-in., 8 M.	..
	3rd	**Orizaba**	S.	3497	336 2	43 2	22 0	1	..	Chester, Pa.	1889	Cuba Mail.	8 4-in., 6 M.	14·0
	3rd	**Yumuri**	S.	3497	336 2	43 2	22 3	1	..	"	1889	"	8 4-in., 6 M.	14·0
	3rd	**City of Washington**	I.	2684	300 5	38 4	19 2	1	2500	"	1877	"	8 4-in., 8 M.	15·0
	3rd	**Saratoga**	I.	2820	298 0	38 6	23 5	1	..	"	1878	"	8 4-in., 8 M	14·0
	3rd	**Seneca**	I.	2729	271 5	40 0	16 4	1	..	"	1884	"	8 4-in., 6 M.	..
	3rd	**Yucatan**	I. & S.	3525	336 2	43 2	22 3	1	..	"	1890	"	8 4-in., 6 M.	14·0
	3rd	**Segurança**	S.	4033	321 3	45 3	17 4	1	..	"	1890	"	6 5-in., 4 4-in., 4 1-pr., 3 M.	14·0
	3rd	**Vigilancia**	S.	4115	321 8	45 2	16 5	1	..	"	1890	"	6 5-in., 4 4-in., 4 1-pr., 3 M.	14·0
	4th	**Advance**	I.	2605	295 0	38 0	23 4	1	1350	"	1883	Panama R. R. Co.	Small Q.F.	15·0
	4th	**Alliança**	I.	2985	308 0	42 0	15 0	1	2250	"	1886	"	"	14·0

Pacific Coast.	3rd	City of Sydney . . .	I.	3017	339	0	40	2	20	5	1	1950	„	1875	Pacific Mail.	6 6-in., 10 6-pr., 2 M. . .	15·0
	3rd	City of Peking . . .	I.	5079	408	0	47	0	19	5	1	4500	„	1874	„	6 5-in., 12 6-pr. . . .	13·0
	3rd	City of Rio de Janeiro .	I.	3548	345	0	38	6	19	9	1	2000	„	1878	„	8 4-in., 8 M.	14·0
	3rd	Peru	S.	3528	336	0	45	9	27	6	1	2800	San Francisco .	1892	„	9 5-in., 12 6-pr. . . .	14·0
	4th	City of Panama . .	I.	1490	248	0	36	0	20	2	1	650	Chester, Pa. .	1873	„	Small Q.F.	..
	4th	Colon	I.	2686	280	0	40	0	28	6	1	1350	„	1872	„	„	..
	4th	San Jose	I.	2081	283	0	37	0	21	0	1	1400	„	1882	„	„	..
	4th	San Blas	I.	2075	283	0	37	0	21	0	1	1400	„	1882	„	„	..
	4th	San Juan	I.	2076	283	0	37	0	21	0	1	1400	„	1882	„	„	..
	4th	Acapulco	I.	2572	290	0	40	0	20	0	1	1350	Wilmington .	1873	„	„	..

Converted Merchant Vessels Retained.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.	No.				£	in.	in.			knots.	tons.	
cr.	Buffalo . .	S.	6888	380	6	48	0	22	0	1	3600	Newport News	1893	117,949	..	..	2 5-in. Q.F., 4 4-in., 6 6-pr., 2 M. .	..	14·5	100	297
cr.	Dixie . . .	S.	6114	389	2	48	0	19	11	1	1371	Newport News	1893	117,949	..	..	10 6-in. Q.F., 6 6-pr., 2 M. . .	..	16·0	1371	181
cr.	Panther . .	I.	4260	310	0	40	0	18	3	1	..	Philadelphia	1889	77,055	..	..	6 5-in. Q.F., 2 4-in., 6 3-pr., 1 M., 1 l.	..	13·0	475	198
cr.	Prairie . .	I.	6872	390	6	46	10	22	0	1	3800	Philadelphia	1890	117,949	..	..	10 6-in. Q.F., 6 6-pr., 2 M. . .	..	14·5	1000	295
cr.	Yankee . .	I.	6888	380	6	48	0	22	0	1	3800	Newport News	1892	117,949	..	..	10 5-in. Q.F., 6 6-pr., 2 M. . .	..	14·5	1000	282
cr.	Yosemite . .	I.	6179	389	2	48	0	20	1	1	3900	Newport News	1892	117,949	..	..	10 6-in. Q.F., 6 6-pr., 2 M. . .	..	16·0	1371	285
cr.	Mayflower (yacht)	S.	2690	275	0	36	0	17	3	2	4700	Clydebank .	1896	88,359	..	..	2 5-in. Q.F., 12 6-pr., 2 M. . .	..	16·8	584	160

There are also 22 other converted yachts, varying in displacement from 82 tons to 975 tons.

SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LITTLE OR NO IMPORTANCE.

Belgium.—Twelve steam vessels, between 419 and 684 tons net, launched between 1870 and 1888, principally employed as packets, which are under the orders of the Government.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's Yacht. Two armoured gunboats, for the defence of the Danube, building at Leghorn. Other ships are to be laid down. The Nadiezda, a despatch vessel (715 tons) of the French Casabianca type; length, 219 ft. 6 in.; beam, 27 ft. 6 in.; draught, 12 ft. 6 in.; launched at Bordeaux in 1898, steamed at 18·85 knots at her trials; engines, 2600 I.H.P.; Lagrafel and d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo-tubes.

Ecuador.—The two old (1886) French despatch vessels, Papin and Inconstant (891 tons) built of wood and iron have been bought. The Republic also possesses a torpedo-boat and two steam transport vessels.

Egypt.—This Power has now no efficient warships.

Hayti.—Steel gun vessel—Crête à Pierrot—940 tons, length 210 ft., beam 30 ft.; 1 6·2-in., 1 4·7-in., and 4 3·9-in. Q.F., 6 M. Steel gunboat—Capois la Mort—260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines—1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 M. Three iron or steel sloops:—St. Michael, 1804, and Toussaint L'Ouverture, of from 500 to 900 tons, all of 12 to 14 knots speed, and armed with one large and four to eight small guns. Gun vessel, 22nd of December, of 900 tons, 9 knots speed, armed with four 40-pr. Armstrongs.

Mexico.—The Zaragoza, built of steel, 1200 tons, 1300 horse-power, 15 knots speed, and armed with four 4·7-in. guns and 4 rapid-firing guns. Two gun vessels, Democrata and Mexico, of 450 tons and 11 knots speed, armed with two 6½-inch muzzle loaders and two small guns. Two small gunboats of 10 knots speed. A gunboat is in hand at New Orleans. Five torpedo-boats. An account of the shipbuilding programme will be found in the chapter on the "Progress of Foreign Navies."

Morocco.—A torpedo cruiser, of 1200 tons displacement 2500 HP., 18 knots speed, and carrying two guns, 4·7-in. B.L., and 4 Q.F. guns, built in 1892. A gunboat of 450 tons, 1200 I.H.P.

14·5 knots, is completing at Sampierdarena (Maclaren & Wilson), and another has been laid down.

Persia.—Despatch vessel—the Persepolis—of 1200 tons and 10 knots speed. She is armed with 5 small breech-loading guns.

Peru.—Lima, built in 1881, of 1700 tons displacement, 1800 horse-power, and 16 knots speed; armed with two 6-in. B.L.R. guns. Screw steamer Santa Rosa, of about 400 tons.

Roumania.—Elizabetha, protected cruiser (deck 3 in. thick), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam, 1320 tons, 4500 I.H.P.; 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 350 tons; Grivitza, 180 tons. Six gunboats of 45 to 110 tons, 7 to 9 knots speed. Six coast-guard vessels—Oltul, Siretul, Bistritza, Olteano, Smeo, and Monteano —95 tons, 100 ft. long, 13·6 in. beam, 6 ft. draught; speed, natural draught 11 knots, forced draught 13½ knots; 1 Q.F., 2 M. Screw steamer—Romania—240 tons, repaired 1890. Six first-class torpedo-boats (120 ft. 6 in., 21 knots); 2 second class (63 ft., 16·5 knots), built 1882–1888. The shipbuilding programme contemplates the building of 8 monitors of 500 tons, 12 torpedo-boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo-boats for the Black Sea.

Saint Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gun-vessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively of low speed, each armed with two guns.

Siam.—Two corvettes (800 tons, 8 guns); six gunboats. One deck-protected cruiser, the Maha Chakrkri, 290 ft. long, 39 ft. 4 in. broad, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. quick-firing guns, and ten 6-pr. quick-firing guns. Cruiser Makut-Rajakamar, 650 tons.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; General Rivera, 300 tons, 12 knots speed, armed with 1 5·9-in. and 1 2·3-in. gun; and the General Jaurez.

Venezuela.—Gun-vessel, Libertador, 832 tons. Four river gunboats building.

BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

Great Britain and Dependencies.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
TORPEDO-BOAT DESTROYERS													
†Ardent	Chiswick ..	1894	201·6	19	7·3	2	247	4,500	27·97	1-12 pr. 5-6 prs.	2	45	60
Banshee	Birkenhead ..	1894	210	19·5	..	2	290	4,400	27·97	1-12 pr. 5-6 prs.	2	50	
†Boxer	Chiswick ..	1894	201·6	19	7·3	2	247	4,500	27·17	1-12 pr. 5-6 prs.	2	45	60
†Bruiser	Chiswick ..	1895	201·6	19	7·3	2	247	4,500	27·97	1-12 pr. 5-6 prs.	2	45	60
*Charger	Poplar	1894	190	18·5	5·25	2	250	3,100	27·98	1-12 pr. 5-6 prs.	2	45	60
Conflict	East Cowes ..	1894	205·6	20	..	2	270	4,370	27·21	1-12 pr. 5-6 prs.	2	50	
Contest	Birkenhead ..	1894	210	19·5	..	2	290	4,400	27·4	1-12 pr. 5-6 prs.	2	50	
†Daring	Chiswick ..	1893	185	19	7	2	237	4,300	27·70	1-12 pr. 3-6 prs.	3	45	50
*Dasher	Poplar	1895	190	18·5	5·25	2	250	3,182	26·21	1-12 pr. 5-6 prs.	2	45	60
†Decoy	Chiswick ..	1894	185	19	7	2	237	4,300	27·76	1-12 pr. 3-6 prs.	3	45	50
Dragon	Birkenhead ..	1894	210	19·5	..	2	290	4,500	27·14	1-12 pr. 5-6 prs.	2	50	
Ferret	Birkenhead ..	1893	194	19·25	5	2	280	4,810	27·62	1-12 pr. 3-6 prs.	3	50	70
Fervent	Paisley	1895	200	19	7·8	2	270	3,800	[27]	1-12 pr. 5-6 prs.	2	50	70
†Handy	Fairfield ..	1895	200	19	7·8	2	260	3,800	27·04	1-12 pr. 5-6 prs.	2	50	70
Hardy	Sunderland ..	1895	196	19	5	2	245	4,200	26·8	1-12 pr. 5-6 prs.	2	50	70
†Hart..	Fairfield ..	1895	185	19	7	2	260	4 010	27·07	1-12 pr. 5-6 prs.	2	50	70
*Hasty	Poplar	1894	190	18·5	5·25	2	250	3,250	26·08	1-12 pr. 5-6 prs.	2	45	60
Haughty..	Sunderland ..	1895	196	19	5	2	265	4,000	27·1	1-12 pr. 5-6 prs.	2	50	60
Havock	Poplar	1893	180	18·5	5·25	2	240	3,500	26·77	1-12 pr. 3-6 prs.	3	43	57
Hornet	Poplar	1893	180	18·5	5·25	2	240	4,000	27·31	1-12 pr. 3-6 prs.	3	43	57
†Hunter	Fairfield ..	1895	..	..	..	2	260	4,000	27·2	1-12 pr. 5-6 prs.	2		
Janus	Jarrow	1895	200	19·7	6·5	2	252	3,789	27·8	1-12 pr. 5-6 prs.	2	50	60
Lightning	Jarrow	1895	200	19·7	6·5	2	252	4,007	27·94	1-12 pr. 5-6 prs.	2	50	60
Lynx	Birkenhead ..	1894	194	19·25	5	2	280	4,000	27·00	1-12 pr. 3-6 prs.	3	50	70
Opossum	Hebburn ..	1895	200	19	5·2	2	290	4,052	28·24	1-12 pr. 5-6 prs.	2	50	60
Porcupine	Jarrow	1895	200	19·7	6·5	2	288	3,866	27·91	1-12 pr. 5-6 prs.	2	50	60
Ranger	Hebburn ..	1895	200	19	5·2	2	264	3,900	27·13	1-12 pr. 5-6 prs.	2	50	60
Rocket	Clydebank ..	1894	205·6	19·5	5·25	2	280	4,200	27·37	1-12 pr. 5-6 prs.	2	50	60
Salmon	Hull	1895	200	19·5	5·4	2	264	3,580	27·60	1-12 pr. 5-6 prs.	2	50	60
Shark	Clydebank ..	1894	205·6	19·5	5·25	2	280	4,250	27·59	1-12 pr. 5-6 prs.	2	50	60
Skate	Barrow	1895	195	20·5	..	2	265	4,100	27·10	1-12 pr. 5-6 prs.	2	50	60
Snapper	Hull	1895	200	19·5	5·5	2	270	4,500	27·9	1-12 pr. 5-6 prs.	2	50	60
Spitfire	Elswick ..	1895	200	19	5·3	2	300	3,780	27·5	1-12 pr. 5-6 prs.	2	45	60
Starfish	Barrow	1894	195	20·5	..	2	265	4,000	27·97	1-12 pr. 5-6 prs.	2	45	60
Sturgeon	Barrow	1894	195	20·5	..	2	265	4,010	27·16	1-12 pr. 5-6 prs.	2	45	60
Sunfish	Hebburn ..	1895	200	19	5·2	2	290	4,292	27·62	1-12 pr. 5-6 prs.	2	50	60
Surly	Clydebank ..	1894	205·6	19·5	5·25	2	280	4,400	28·05	1-12 pr. 5-6 prs.	2	50	50
Swordfish	Elswick ..	1895	200	19	5·3	2	300	4,100	[27]	1-12 pr. 5-6 prs.	2	45	60
Teazer	East Cowes ..	1895	200	19·5	5·6	2	270	4,500	[27]	1-12 pr. 5-6 prs.	2	50	60
Wizard	East Cowes ..	1895	200	19·5	5·2	2	270	4,400	[27]	1-12 pr. 5-6 prs.	2	45	60
Zebra	Blackwall ..	1895	200	20	6	2	300	3,850	27·00	1-12 pr. 5-6 prs.	2	50	60
Zephyr	Paisley	1895	200	19	5·3	2	270	3,850	[27]	1-12 pr. 5-6 prs.	2	50	60
†Albatross	Chiswick ..	1898	227·6	21·25	8·5	2	360	7,900	32	1-12 pr. 5-6 prs.	2	68	100
†Angler	Chiswick ..	1896	210	19·6	7·1	2	278	5,800	30·37	1-12 pr. 5-6 prs.	2	60	80
Arab	Clydebank ..	bldg.					Design not complete			1-12 pr. 5-6 prs.	2	60	80
†Ariel	Chiswick ..	1897	210	19·6	7·1	2	278	5,800	30·59	1-12 pr. 5-6 prs.	2	60	80
†Avon	Barrow	1896	210·6	21·6	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Bat	Jarrow	1896	215	20·75	6·8	2	326	6,185	30·1	1-12 pr. 5-6 prs.	2	60	91
†Bittern	Barrow	1897	210·6	21·6	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Brazen	Clydebank ..	1896	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Bullfinch..	Hull	bldg.	210	20·6	5·8	2	300	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Chamois	Jarrow	1896	215	20·75	6·8	2	325	6,333	30·2	1-12 pr. 5 6 prs.	2	60	91
†Cheerful	Hebburn ..	1897	210	21·0	8	2	308	6,000	30	1-12 pr. 5-6 prs.	2	62	82
†Coquette	Chiswick ..	1898	210	19·5	7·2	2	285	5,800	30·31	1-12 pr. 5-6 prs.	2	60	80
Crane	Jarrow	1896	215	20·7	6·8	2	324	6,336	30·3	1-12 pr. 5-6 prs.	2	60	80
†Cygnet	Chiswick ..	1898	210	19·5	7·2	2	285	5,800	30·35	1-12 pr. 5-6 prs.	2	60	80
†Cynthia	Chiswick ..	1898	210	19·5	7·2	2	285	5,800	30·2	1-12 pr. 5-6 prs.	2	60	80
†Desperate	Chiswick ..	1895	210	19·6	7·2	2	275	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Dove	Hull	bldg.	210·0	20·6	5·8	2	300	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Earnest	Birkenhead ..	1896	210·6	21·7	5·3	2	300	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Electra	Clydebank ..	bldg.	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Express	Birkenhead ..	1897	227 6	22·0	9	2	300	9,000	33	1-12 pr. 5-6 prs.	2	60	80
Fairy	Fairfield ..	1897	227·6	22·0	9	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Falcon	Fairfield ..	bldg.	220	22·3				6,000	30				
†Fame	Chiswick ..	1896	210·6	19·6	7·1	2	275	5,800	30·16	1-12 pr. 5-6 prs.	2	60	80

* Built by Yarrow, fitted with Thornycroft W. T. boilers at Earle's. All Jarrow-built destroyers have Reed's boilers. Vessels marked † have Thornycroft W. T. boilers.

Great Britain and Dependencies—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO BOAT DESTROYERS			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Fawn	Jarrow	1897	215	20·7	6·8	2	325	6,581	30·5	1-12 pr. 5-6 prs.	2	60	91
Flirt	Jarrow	1897	215	20·7	6·8	2	328	6,682	30	1-12 pr. 5-6 prs.	2	60	91
Flyingfish	Jarrow	1897	215	20·7	6·8	2	323	6,416	30·4	1-12 pr. 5-6 prs.	2	58	91
†Foam	Chiswick	1896	210	19·6	7·1	2	275	5,800	30·18	1-12 pr. 5-6 prs.	2	58	80
Gipsy	Fairfield	1897	227·6	22·0	9	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Greyhound	Hawthorn's	1900	210	21	8·6	2	316	6,000	30	1-12 pr. 5-6 prs.	2	60	90
Griffon	Birkenhead	1896	210·0	20	5·3	2	300	6,000	30·11	1-12 pr. 5-6 prs.	2	58	80
Kestrel	Clydebank	bldg.	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
f Kangaroo	Jarrow	bldg.	215	20·75	6·8	2	335	6,500	30	1-12 pr. 5-6 prs.	2		91
†Lee	Sunderland	1899	210·0	19·9	7·6	2	283	5,400	30	1-12 pr. 5-6 prs.	2	58	80
Leopard	Barrow	1897	210	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Leven	Fairfield	bldg.	218·0	20.0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Lively	Clydebank	bldg.	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Locust	Birkenhead	1896	210	21·7	5·3	2	300	6,000	30·16	1-12 pr. 5-6 prs.	2	58	80
†Mallard	Chiswick	1896	210·6	19·6	7·1	2	275	5,800	30·11	1-12 pr. 5-6 prs.	2	60	80
Mermaid	Hebburn	1898	210	21·0	8	2	308	6,000	30	1-12 pr. 5-6 prs.	2	62	82
f Myrmidon	Jarrow	bldg.	215	20·75	6·8	2	335	6,500	30	1-12 pr. 5-6 prs.	2		91
Orwell	Birkenhead	bldg.	218·0	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Osprey	Fairfield	bldg.	227·6	22·0	9	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Ostrich	Fairfield	bldg.	210	21·0				6,000	30				
Otter	Barrow	1896	210	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Panther	Birkenhead	1897	210·6	21·7	5·3	2	300	6,000	30·14	1-12 pr. 5-6 prs	2	58	80
Peterel	Jarrow	1899	215	20·75	6·8	2	334	6,500	30	1-12 pr. 5-6 prs.	2		91
Quail	Birkenhead	1895	213·6	21·6	5·3	2	300	6,000	30·38	1-12 pr. 5-6 prs.	2	58	90
Racehorse	Hawthorn's	1900	210	21	8·6	2	316	6,000	30	1-12 pr. 5-6 prs.	2	60	90
Recruit	Glasgow	bldg.	218·0	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Roebuck	Hawthorn's	1901	210	21	8·6	2	316	6,400	30	1-12 pr. 5-6 prs.	2	60	90
Seal	Birkenhead	1897	218·0	20·0	5·6	2	300	6,000	30·15	1-12 pr. 5-6 prs.	2	58	80
Sparrowhawk	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Spiteful	Jarrow	1898	215	20·75	6·8	2	334	6,500	30·1	1-12 pr. 5-6 prs.	2		91
Sprightly	Clydebank	bldg.	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
†Stag	Chiswick	1899	210	19·75	7·2	2	285	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Star	Jarrow	1896	215	20·75	6·88	2	328	6,266	30·7	1-12 pr. 5-6 prs.	2	58	91
Success	Sunderland	bldg.	210·0	21·0	9·2¼	2	350	6,000	30	1-12 pr. 5-6 prs.	2	62	43
†Sylvia	Sunderland	bldg.	210	19·9	7·6	2	283	5,400	30	1-12 pr. 5-6 prs.	2	58	80
f Syren	Jarrow	bldg.	215	20·75	6·8	2	335	6,500	30	1-12 pr. 5-6 prs.	2		91
Thrasher	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
†Violet	Sunderland	bldg.	210	20·75	6·88	2	283	5,400	30	1-12 pr. 5-6 prs.	2	58	80
a Viper	Hebburn	1899	210	21	7	8	312¼	10,000	35	1-12 pr. 5-6 prs.	2	62	88
Virago	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
d Vixen	Barrow	bldg.	210·0	20·0	5·8	2	327	6,000	30	1-12 pr. 5-6 prs.	2	62	88
Vulture	Clydebank	bldg.	218	20	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Whiting	Jarrow	1896	215	20·75	6·88	2	330	6,239	30·2	1-12 pr. 5-6 prs.	2	58	91
Wolf	Birkenhead	1897	218	20	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
a Cobra	Elswick	1900	223·6	20·6	6·0	12	400		34·9	1-12 pr. 5-6 prs.	2	63	107
TORPEDO BOATS—													
FIRST CLASS—													
1 (*ex* Lightning)	Chiswick	1877	84·6	10·9	5	1	27	460	19	..	1	..	
2-9 (8 boats)	Chiswick	1878-9	87	10·9	4	1	28	450	20	..	1	15	
10	Chiswick	1880	90·5	10·9	4	1	28	450	21·7	..	1	15	
11, 12 (2 boats)	Chiswick	1880	87	10·9	4	1	28	450	20	..	1	15	7
13	Lambeth	1878	87	10·9	4	1	28	460	21	..	2	15	7
14	Poplar	1878	87	11	4·5	1	33	550	22	..	2	15	7
15	..	..	87	10·9	4	1	28	450	21	..	2	15	7
17, 18 (2 boats)	Poplar	1877	86	11	4·5	1	33	450	21	..	2	15	7
19	East Cowes	1878	87	10·9	4	1	28	460	21	..	2	15	7
20	..	1880	87	10	4	..	28	360	16·9	..	2	15	
21, 22 (2 boats)	Chiswick	1885	113	12·5	5·7	1	63	730	20	..	3	..	10
23, 24 (2 boats)	Poplar	1885-6	113	12·5	5·5	1	67	600	19·5	2-3 prs.	3		
25-29 (5 boats)	Chiswick	1886	127·5	12·5	6·2	1	60	600	21	..	4	15	
30-33 (4 boats)	Poplar	1886	125	13	5·5	1	60-66	670	19·5	2-3 prs.	5	15	20
c 34-38 (5 boats)	East Cowes	1886	125	14·6	4	1	60-66	950	18-19	..	5	15	
39, 40 (2 boats)	Poplar	1885	100	12·5	..	..	40	500	..	..	1	15	
41-60 (20 boats)	Chiswick	1886	127·5	12·5	6·2	1	60	700	21	2-3 prs.	4	15	
61, 63-74, 76-78 (16 boats)	Poplar	1886	125	13	5·5	1	75	700	19-20	2-3 prs.	5	15	20
79	Poplar	1886	125	13	5·5	..	75	1,000	22·4	2-3 prs.	..	15	20
80	Poplar	1887	135	14	6	1	105	1,540	23	4-3 prs.	5	21	30
81 (*ex* Swift)	East Cowes	1885	150	17·5	..	1	125	..	..	6-3 prs.	3	25	35
82-87 (6 boats)	Poplar	1889	130	13·5	5·5	1	85	1,100	23	3-3 prs.	3	19	20
88, 89 (2 boats)	Poplar	1894	142	14·75	4·5	1	112	1,600	..	3-3 prs.	3	18	20
90	Poplar	1895	140	14·25	3·7	1	109	1,430	..	3-3 prs.	3	18	18
91, 92 (2 boats)	Chiswick	1894	140	15·5	7·5	1	130	2,400	23-24	3-3 prs.	3	18	25
93	Chiswick	1893	140	15·5	5·4	2	130	2,200	23·5	3-3 prs.	3	18	25
94-96 (3 boats)	East Cowes	1894	140	15·5	..	1	130	2,000	23·2	3-3 prs.	3	18	25
97	Birkenhead	1893	140	15·5	..	1	130	2,690	23·35	3-3 prs.	3	18	25
g {98 and 99, 107 and 108}	Chiswick	bldg.	160	17	8·4	1	178	2,850	25	3-3 prs.	3	32	20

a This vessel is fitted with the Parsons compound steam turbine. *b* Fitted with Yarrow boilers made by R. and W. Hawthorn, Leslie & Co., *c* No. 34 is fitted with Laird W. T. boilers. *d* Has four Express W. T. boilers. *e* Programme 1900-1901. Nos. 51, 87 fitted with Earle's W. T. boilers. *f* Reed's W. T. boilers. *g* Water-tube boilers of Thornycroft type.

Great Britain and Dependencies—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO BOATS.—*cont.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SECOND CLASS—													
38–48 (10 boats)	Poplar	1889	60	9·2	3·7	1	16·5	230	16·5	1 mach.	1	9	11
49, 50 (2 boats)	Poplar	1887	60	8·5	3	1	15	200	17	1 mach.	1	9	
51–62 (12 boats)	Chiswick ..	1878–9	60·5	7·5	3·5	1	..	..	16·5	..	2	7	
63	..	1879	60	..	..	1	..	..	15	..	2		
64–73 (10 boats)	Chiswick ..	1880–1	60·5	7·5	3·5	1	..	..	16–17	..	2	7	
74, 75, 96, 97 (4 boats)..	Poplar .. .	1883	62	7·6	3·6	1	12	..	16	1 mach.	2	7	
76–95 (20 boats)	Chiswick ..	1882–3	63	7·5	3·5	1	..	..	16·5–17	..	2	7	
98	Chiswick ..	1883	66·3	7·5	2·5	hyd.	..	120	12·6	..	2	7	
99, 100 (2 boats)	Chiswick ..	1886	64	8	3·6	1	..	..	16–16·8	..	2	7	
101	..	..	64	..	..	..	..	..	..	..	2	7	
1–9 (9 boats)..	East Cowes ..	..	56	..	..	1	12	..	14·5	2 mach.	sp	..	?
COLONIAL, ETC.—													
Victoria.													
Childers	Chiswick ..	1883	113	12·5	5·9	1	65	730	20	2–1 prs.	..	12	10
One boat	Poplar	1891	130	13·5	5·7	1	82	1,150	23	3–3 prs.	3	19	20
Nepean, Lonsdale (2 boats)	Chiswick ..	1884	63	7·5	3·2	1	12	150	17·5	..	1	7	
New South Wales.													
Acheron, Avernus (2 boats)	..	1879	..	..	..	1	16	300	16				
Queensland.													
Mosquito	Chiswick ..	1884	63	7·5	3·2	1	12	..	17	..	1	7	
Wasp	..	..	..	..	..	..	12	..	..	..	..	7	
Tasmania.													
One boat	Chiswick ..	1884	63	7·5	3·2	1	12	..	17	..	1	7	
New Zealand.													
Nos. 1–4 (4 boats)	Chiswick ..	1884	63	7·5	3	1	12	170	17	1 mach.	Sp.		
India.													
Nos. 1–3 (3 boats)	Chiswick ..	1888	134·5	14·8	7·1	1	96	1,270	23·2	2 Q.F.	5		
Nos. 4 6 (3 boats)	East Cowes ..	1889	130	14·6	..	..	95	1,030	20				
No. 7	Paisley	1888	130·4	14	..	..	92	1,060	21				

Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Poplar.. ..	1896	190	19 6	7·4	2	280	4,000	27·4 *t.*	*1 14-pr.	3	54	80
Missiones..	Poplar.. ..	1896	190	19·6	7·4	2	280	4,000	26·0 *t.*	3 6-pr,	3	54	80
Entre Rios	Poplar.. ..	1896	190	19·6	7·4	2	280	4,000	26·7 *t.*	Q.F., 2 M.	3	54	80
FIRST CLASS—													
2 boats	Chiswick ..	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Poplar.. ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15
4 boats	Poplar.. ..	1880–2	100	12·5	6	1	52	600	20	2 mach.	3	14	10
SECOND CLASS—													
Nos. 1–8 (8 boats)..	Poplar.. ..	1890	60	9.2	3	1	16	230	17	1 Q.F.	1	10	1·25
Nos. 9–10 (2 boats)	Chiswick ..	1881	60	7·5	3·5	1	16	230	17	..	1		
VEDETTE BOATS—													
Nos. 1–4 (4 boats)..	..	1875	55	7	..	..	..	..	..	..	sp.		

The two 150-ft. boats are named Comodoro Py and Murature.

The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne. They have locomotive boilers.

The four 100-ft. boats are named Alerta, Centella, Ferre, and Py.

* ½-in. plating over entire engine and boiler space (Yarrow W.T. boilers).

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Adler, Falke	Poplar.. ..	1886	135	13·7	5·6	1	95	900	22·4	2 Nord.	2	16	28
22 boats	Elbing, Trieste, &c.	1886-9	128	15·9	6·9	1	83	900 / 1,000	17·5 to 21·5	2 mach.	2	15	28
Boa .. .. / Cobra .. .. .. / Kigyo .. .. .. / Python	Poplar.. ..	1898–9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr. Q.F.	3	24	30
Viper	Poplar.. ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr. Q.F.	2	26	30
Natter	Elbing ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr. Q F.	3	..	30
SECOND CLASS—													
Nos. 9, 10 (2 boats)	Chiswick, Poplar, Pola and Elbing	1881	98·5	10·8	2·9	1	37	450	17	1 Q.F.	1		
Nos. 11–32 (22 boats)		1883–7	107	11·6	3·1	1	47	600	17				
Nos. 33–39 (7 boats)		1887–91	118·1	14·4	3·3	1	64	700	18	2 Q.F.	1		
Nos. 2–8 (7 boats) ..	Pola and Poplar ..	1878-81	87·4	9·6	2·8	1	27	300	15	..	1		

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Nos. 1–5 (5 boats	Poplar.. ..	1882	100	12·5	5·5	1	52	600	20	2 mach.	2	16	20
Araguary	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·1	2 Q.F.	4	27	22
Iguatemi	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·4	2 Q.F.	4	27	22
Marcilio Diaz	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·8	2 Q.F.	4	27	22
5 boats	Elbing ..	1892–3	152	17·2	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Piratiny	..	..	130	12	..	..	..	..	10	2–1 pr.	1		
Poty	..	..	126	12	3	..	30	..	18	1–1 pr.	1		
SECOND CLASS—													
Inhanhuay (wood)..	New York..	1893	90	10	3	..	17	..	25	1–1 pr.	1	10	
4 boats	..	1883–4	..	..	..	1	17	..	17				
1 boat	Chiswick ..	1885	63	75	3·2	1	..	..	17	..	..	..	2
1 boat	Poplar.. ..	1886	60	8	3	1	14	200	17	..	1		
THIRD CLASS—													
Moxoto	Poplar.. ..	1883	60	9·3	..	..	..	..	16	1–1 pr.	1		
5 boats	Chiswick ..	1883	45	6	1·2	1	3·5	..	12-13	1 mach.	sp.		

Chili.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Capitan Orella ..	Birkenhead.	1896	210	21·6	..	2	300	6000	30·17	1-12 pr. Q F. 5-6 pr.	2	65	90
Capitan Munoz Gamero.. ..	Birkenhead.	1896	210	21·6	..	2	300	6000	30·42	1-12 pr Q.F. 5–6 pr.	2	65	90
Teniente Serrano ..	Birkenhead.	1896	210	21·6	..	2	300	6000	30·35	1–12 pr. Q.F. 5·6 pr.	2	65	90
Guardia-Marina Riquelme ..	Birkenhead.	1896	210	21·6	..	2	300	6000	30·09	1-12 pr Q.F. 5-6 pr.	2	65	90
FIRST CLASS—													
3 boats	Poplar.. ..	1881	86	12·5	..	1	25	400	19–20	..	4	15	
5 boats	Poplar.. ..	1881	100	12·5	..	1	35	400	18–1[illegible]	4 mach.	4	15	9
Sarjento Aldea ..	Poplar.. ..	1886	125	13·5	5·5	1	70	800	20	2 Q.F.	4	18	15
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type) ..	Poplar.. ..	1896 1898	152·6	15·3	7·9	1	140	2200	27·5 27·2	3-3 pr. Q.F.	3	28	40
Janequeo, Guale, Rucumilla and Guacolda	Poplar.. ..	1881	100	12·5	..	1	..	450	..	..	..	..	
Tegualda, Quidora, and Fresia	Poplar.. ..	..	87	10·9	..	1	..	400	..	..	..	..	
SECOND CLASS—													
1 boat	East Cowes	1887	50	..	..	..	..	..	16	..	.	..	
1 boat	East Cowes	1892	60	9·6	5	1	15	270	19	..	1	..	
1 boat	La Seyne ..	1895	42	8·6	..	1	..	..	..	..	1	..	

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso.

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
First Class—													
1 boat	Elbing ..	1886	144·3	16·4	7·5	1	128	1,400	24·2	4 1-pr. revs.	2	20	15
1 boat	Poplar.. ..	1887	128	13	5	1	69	1,000	23·9	{ 3 Q.F., 4 Gatlings }	3	28	15
25 boats	Stettin, &c..	1886–87	110	13	4·9	1	65	1,000	19·5	1-pr. revs.	3	16	10
2 boats	Stettin ..	1883	86	10·4	3·4	1	28	650	18·2	1-pr. revs.	2	16	12
1 boat	Stettin ..	1884	123·5	21·7	..	..	..	..	19	..	5	16	
2 boats	Elbing ..	1895	128	15·8	..	..	120	1,250	24·5	Q.F.	2		
Second Class—													
11 boats	Elbing ..	1885–86	85	11·9	4·8	1	27	400	19	..	1	..	5
1 boat	Foochow ..	Bldg.	88·6	6·7	3·3	1	30	550	20·5				

About twenty boats only are said to be serviceable. The four destroyers built at Elbing in 1898–9 were captured by the Allies from the Chinese at Taku, 1900, and added to the navies of Great Britain France, Germany and Russia.

Costa Rica.

Costa Rica has one 62-ft., 15-knot boat.

Denmark.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
First Class—													
Hajen	Copenhagen	1896 }											
Havörnen	Copenhagen	1897 }	154·3	15·4	7·9	2	142	2,317	22·9	{ 1 4·7-in. 1 1-pr. }	3	..	..
Söbjörnen	Copenhagen	1898 }											
Delfinen	Chiswick ..	1883	111·5	12·6	6	1	59	620	2[illegible]	1 mach.	2	14	9
Havhesten	Chiswick ..	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Chiswick ..	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Chiswick ..	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen.. ..	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs.	4	..	16
Sölöven	Chiswick ..	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Söulven	Havre.. ..	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stören	Chiswick ..	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Chiswick ..	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9
Second Class—													
Nos. 4, 5 (2 boats) ..	Chiswick ..	1882	63	7·5	2·5	1	15	[illegible]	16·9	1 mach.	2	6	1
Nos. 6, 7 (2 boats) ..	Chiswick ..	1884	66·8	8	4·2	1	16	170	15·4	1 mach.	2	6	1·5
Nos. 8, 9 (2 boats) ..	Chiswick ..	1886	69·5	8·1	3·8	1	17	170	15·7	1 mach.	2	6	1
Nos. 10, 11 (2 boats).	Chiswick ..	1888	70·2	8	4	1	18	180	15·8	1 mach.	2	6	1
Nos. 12, 13 (2 boats).	Chiswick ..	1889	78·3	9	4·9	1	24	350	18	1 mach.	2	8	3
1 boat	Chiswick ..	1875	58	7·5	3	1	..	..	16	..	sp.		

Four destroyers and two boats are provided for.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Arquebuse	Normand	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Carabine	Rochefort	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Durandal	Normand	1899	180·5	20·8	10·3	2	300	5000	27·4	1-9pr. 6-3prs.	2	45	84
Epée	Havre (F.&C.)	1900	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	48	33
Epieu	Havre (F.&C.)	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Escopette	Rochefort	1900	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	45	48
Espingole	Normand	1900	183·9	20·8	10·3	2	300	5000	27·2	1-9pr. 6-3prs.	2	45	84
Fauconneau	Normand	1900	183·9	20·8	10·3	2	300	5000	27·1	1-9pr. 6-3prs.	2	45	84
Flamberge	Rochefort	Bldg.	183·9	20 8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	45	48
Framée*	Nantes	1900	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	48	33
Fronde	Bordeaux	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Hallebarde	Normand	1899	180·5	20·8	10·3	2	300	5000	27·2	1-9pr. 6-3prs.	2	45	84
Harpon	Bordeaux	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Javeline	Nantes	Bldg.	183·9	20·11	10 3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Mousquet	Nantes	Bldg.	183·9	20·11	10·3	2	300	6 00	..	1-9pr. 6-3prs.	2	..	..
Pertuisane	Rochefort	1900	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	45	48
Pique	Havre (F.&C.)	1900	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	48	33
Rapière	Rochefort	Bldg.	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	45	48
Sagaie	Havre (F.&C.)	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr. 6-3prs.	2	..	..
Sarbacane	Rochefort	Bldg.	183·9	20·11	10·3	2	300	6000	..	1-9pr 6-3prs.	2	..	..
Takou †	Elbing	1898	193·7	21·0	..	2	280	6000	35	6-3 pr. Q.F.	2	..	67
Yatagan	Nantes	1900	183 9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	48	33
M 22 to 31	..	Pro.	183·9	19·6	10·3	2	303	4800	26	1-9 pr.	2	48	37
SEA-GOING—													
Agile	La Seyne ..	1889	139	14·7	7·7	2	121	1,100	20·4	3-3 prs.	2	26	14
Alarme	St. Nazaire	1889	151	15·7	8·3	2	169	1,400	20·5	2-3 prs.	4	30	40
Aquilon	Normand ..	1895	137·8	14·6	7·9	2	127	2,000	23·17	2-3 prs.	2	34	17
Archer	Normand ..	1893	138	14·7	6·5	2	131	1,250	21	2-3 prs.	2	26	17
Argonaute	St. Denis ..	1893	141	16·4	9·3	2	132	1,500	25·1	2-3 prs.	2	34	16
Audacieux	Nantes ..	1900	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Aventurier	St. Nazaire..	1889	151	15·7	8·3	2	174	1,400	20·5	2-3 prs.	4	34	40
Averne	Havre (F.&C.)	1894	141	16·4	9·3	2	133	1,500	24·4	2-3 prs.	2	27	16
Borée	Bordeaux ..	Bldg.	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Bourrasque	Normand ..	Bldg.	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Cerbère	..	1899	137·8	14·6	7·9	2	127	2,000	25	2-3 prs.	2	34	17
Chevalier	Normand ..	1893	144·3	15·7	6·8	2	134	2,700	27·2	2-1 prs.	2	32	17
Corsaire	St. Denis ..	1893	160·5	15	5·4	2	171	2,500	25·5	4-1 prs.	2	32	15
Coureur	Chiswick ..	1888	147·5	14·5	4·6	2	129	1,550	23·28	4 Nords.	2	27	22
Cyclone (ex-Tenare)	Normand ..	1898	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Dauphin	Havre (F.&C.)	1894	141	16·4	9·3	2	137	1,500	25·22	2-3 prs.	2	34	16
Défi	St. Nazaire..	1889	151	15·7	8·3	2	173	1,400	21	2-3 prs.	4	30	40
Dragon	Normand ..	1892	138	14·7	8·2	2	129	1,400	25	2-3 prs.	2	26	15·5
Eclair	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·5	3-3 prs.	2	26	17
Flibustier	Normand ..	1894	143	16·4	9·3	2	132	1,500	23·5	2-3 prs.	2	34	16
Forban	Normand ..	1895	144·2	15·2	10	2	135	3,200	31·2	2-1 prs.	2	..	..
Grenadier	Normand ..	1892	138	14·7	8·2	2	129	1,400	25·25	2-3 prs.	2	26	15·5
Grondeur	Havre (F.&C.)	1892	147·5	14·5	5	2	130	1,550	24	2-3 prs.	2	27	20
Kabyle	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·6	3-3 prs.	2	27	17
Lancier	Normand ..	1893	138	14·7	8·2	2	128	1,400	25·79	2-3 prs.	2	26	15·5
Mangini	Nantes ..	1896	147·6	14·8	7·9	2	129	2,100	27·5	2-3 prs.	2	34	17
Mistral	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Mousquetaire	Havre (F.&C.)	1892	154	15·7	7	2	150	2,100	24·77	2-1 prs.	2	32	18
Orage	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·7	3-3 prs.	2	26	17
Ouragan	Nantes ..	1887	151	15·7	8·3	2	174	1,400	20	2-3 prs.	4	30	40
Rafale	Normand ..	Bldg.	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Sarrasin	Bourdeaux..	1893	139	14·7	7·7	2	131	1,100	20·5	3-3 prs.	2	26	14
Simoun	Havre (F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2 3 prs.	2	..	18
Siroco	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Téméraire	St. Nazaire..	1889	151	15·7	8·3	2	174	1,400	21	2-3 prs.	4	30	40
Tourbillon	Bourdeaux..	1892	139	14·7	7·7	2	131	1,100	20·5	3-3 prs.	2	26	14
Tourmente	St. Denis ..	1893	141	16·4	9·3	..	132	1,500	24·6	2-3 prs.	2	25	15
Tramontane	Bordeaux ..	Bldg.	147 7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Trombe	Nantes ..	1900	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Turco	St. Denis ..	1892	138	14·7	8·2	2	124	1,400	21·3	2-3 prs.	2	26	15·5
Typhon	Havre (F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Véloce	Havre (F.&C.)	1892	147·5	14·5	5	2	130	1,550	23·6	2-3 prs.	2	27	20
Zouave	St. Denis ..	1892	138	14·7	8·2	2	124	1,400	21·3	2-3 prs.	2	26	15·5
FIRST CLASS—													
Balny	Normand ..	1886	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Bouët-Willaumez	St. Denis ..	1888	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Capt. Cuny	..	1886	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Capt. Mehl	..	1886	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Challier	..	1886	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Dehorter	St. Denis ..	1886	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Deroulède	Normand .	1886	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Doudart de Lagrée	Normand ..	1886	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
Edmond Fontaine	St. Denis ..	1888	134·5	11	7·2	1	66	700	20	2-1 pr. rev.	2	21	12
126–129 (4 boats)	Normand ..	1889-0	118	13·2	8·6	1	80	1,250	21	2-1 prs.	2	21	10
145–149 (5 boats)	Normand ..	1891-3	118	13·2	8·7	1	79	1,300	23·9	2-1 prs.	2	21	10
152–154 (3 boats)	Normand ..	1892-3	118	13·2	8·7	1	80	1,300	24·6	2-1 prs.	2	21	10
155–157 (3 boats)	Bordeaux ..	1893	118	13 2	8·7	1	80	1,300	23	2-1 prs.	2	21	10
158–160 (3 boats)	Cail	1893	118	13·2	8·7	1	80	1,300	23	2-1 prs.	2	21	10

* Framée, lost. † Captured from the Chinese at Taku, 1900. N.B.—"F. & C." "Forges et Chantiers."
"Normand" means that the boat has been built at that firm's yard at Havre.
Six new boats at Havre, 9 at Chalon, 5 at Bordeaux, and 11 others; dimensions not known.

France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—*continued.*													
161–163 (3 boats).. ..	St. Nazaire..	1892	118	13·2	8·7	1	80	1,300	23	2–1 prs.	2	21	10
164–166 (3 boats).. ..	La Seyne ..	1892	118	13·2	8·7	1	79	1,300	23	2–1 prs.	2	21	10
167–169 (3 boats).. ..	Creusot ..	1892	118	13·2	8·7	1	81	1,300	23	2–1 prs.	2	21	10
170, 171 (2 boats).. ..	Normand ..	1893	118	13·2	8·7	1	80	1,300	23–2	2–1 prs.	2	21	10
172, 173 (2 boats).. ..	Havre	1893–4	118	13·2	8·7	1	89	1,390	23–24	2–1 prs.	2	21	10
174–176 (3 boats).. ..	Havre	1893–5	118	13·2	8·7	1	94	1,390	23–24	2 1-prs.	2	21	10
177–179 (3 boats).. ..	Havre.. ..	1893	118	13·2	8·7	1	79	1,300	23–24	2–1 prs.	2	21	10
180–187 (8 boats).. ..	Normand, etc.	1894–5	118	13·2	8·6	1	80	1,500	25·7	2–1 prs.	2	21	10
188–191 (4 boats).. ..	Havre, etc.	1893–4	118	13·2	8·6	1	80	1,500	24–2	2– prs.	2	21	10
192–194 (3 boats).. ..	Havre, etc.	1894–5	118	13·2	8·	1	82	1,300	23·55	2–1 prs.	2	21	10
195–200 (6 boats).. ..	Havre, etc.	1894–5	319	13·2	8·7	1	80	1,300	23·5	2 1-prs.	2	21	10
201–205 (5 boats).. ..	Normand ..	1897–8	121·4	13·4	8·6	1	84	1,700	25·9	2–1 prs.	2	23	10
206–211 (6 boats).. ..	Bordeaux ..	1897–8	121·4	13·6	8·6	1	86	1,500	23·5	2 1-prs.	2	23	10
212–215 (4 boats).. ..	Normand ..	1899	121·4	13·6	8·6	1	86	1,800	27	2 1-prs.	2	23	10
216–226 (11 boats) ..	Cherbourg. Toulon, etc.	1899	121·6	13·6	8·6	1	86	1,500	23·5	2–1 prs.	2	23	10
227–235 (9 boats).. ..	Bordeaux,etc.	Bldg.	121·4	13·2	8·7	1	86	1,500	23·5	2-1-prs.	2	23	10
236–255 (20 boats) ..	Bordeaux,etc.	Bldg.	121.4	13·2	8·7	1	86	1,500	23·5	2-1-prs.	2	23	10
256–257 (2 boats).. ..	..	1900	121·4	13·2	3·7	1	86	1,500	23·5	2–1 prs.	2	23	10
258–261 (4 boats).. ..	Bordeaux ..	Bldg.											
262–263 (2 boats).. ..	Creusot ..	Bldg.											
264–265 (2 boats).. ..	Bordeaux ..												
P. 96	Sargon ..												
SECOND CLASS—													
26	..	1878	108	11	5·6	1	45	400	19	2–1 prs.	2	16	10
27	..	1878	104·4	10·6	6·1	1	44	400	19	2–1 prs.	2	16	10
28	..	1878	111·5	11	5·6	1	44	400	19	2–1 prs.	2	16	10
60–64 (5 boats)	Normand ..	1883	108·2	10·3	6·1	1	45	400	19	2–1 prs.	2	16	10
65, 66, 68 (3 boats) ..	Normand ..	1884	108·2	10·7	6·4	1	49	500	20	2–1 prs.	2	16	10
69–74 (6 boats)	Normand ..	1885	108·2	10·7	6·5	1	50	500	20	2–1 prs.	2	16	10
75 82, 84–109 (34 boats)	Cail, etc. ..	1885–92	114·7	10·6	6	1	54	525	20	2–1 prs.	2	16	10
111–125 (11 boats) ..	La Seyne, etc.	1885–90	114·7	10·6	6 ·	1	54	525	20	2–1 prs.	2	16	10
130–132, 134–144 (14 boats)*	Normand ..	1890–91	111·5	11·4	6	1	52·8	520	21	2–1 prs.	2	16	10
THIRD CLASS—													
8, 10–16, 18, 19 (10 boats)	Various Firms in France and England.	1877–82	86	10·2	5	1	27	200–450	16–19	..	..	10	
20			87	10·8	5	1	33			..	..	10	
22, 23 (2 boats)			87·6	10·4	5·2	1	30			..	..	10	
24, 25 (2 boats)			88·5	10·4	6	1	30			..	..	10	
31			85·5	10·4	3·8	1	27			..	..	10	
33–36 (4 boats)			89	10·4	6	1	32			..	..	10	
37–40 (4 boats)			87	10·8	5	1	32			...	..	10	
41, 42 (2 boats)			87	10·8	6	1	33			..	..	10	
43, 44 (2 boats)			89	10·4	5·7	1	32			..	..	10	
47			87	10·8	5	1	33			..	..	10	
48			89	10·4	5·8	1	32			..	..	10	
49, 50, 53 (3 boats) ..			87	10·8	5	1	32			..	..	10	
54, 55 (2 boats)			91	10	6·1	1	32			..	..	10	
VEDETTE BOATS—													
(1 boat) (aluminium)..	Poplar ..	1894	62·3	9·1	..	1	14	210	20·5	..	1	8	
29, 30 (2 boats)	Chiswick ..	1876	67	8·5	3·5	1	16	..	18	..	1	8	
56, 57 (2 boats)	Chiswick ..	1879	59	7·5	3·5	1	12	50	16	..	1	8	
58, 59 (2 boats)	Chiswick ..	1881	63	7·5	3·5	1	11	50	17	..	1	8	
A, B, C	Creusot ..	1894	62·4	8·9	4·9	1	15	210	16·5	..	1	9	
D, E, F, G, H, I † ..	Creusot ..	1900											
SUBMARINE—													
Algérien	Cherbourg ..	1901	48·8	9·2									
Farfadet	Rochefort ..	1900											
Français	Cherbourg ..	1901	48·8	9·2									
Gnome	Rochefort ..	Bldg.											
Gustave Zédé	Toulon ..	1893	131	..	..	1	266	720	14	..	1	8	
Gymnote	Mourillon ..	1888	59	5·9	5·9	1	30	60	4–6	..	..	4	
Korrigan	Rochefort ..	Bldg.											
Lutin	Rochefort ..	Bldg.											
Morse..	Cherbourg ..	1899	120	9·2	..	..	146	..	13	..	1	9	
Narval	Cherbourg ..	1899	111·6	12·4	5·2	1	106	250	12	..	2	11	..
Silure..	Cherbourg ..	Bldg.											
Espadon	Cherbourg ..	Bldg.											
Sirène..	Cherbourg ..	Bldg.	111·6	12·4	5·2	1	106	250	12	..	2	11	..
Triton..	Cherbourg ..	Bldg.	111·6	12·4	5·2	1	106	250	12	..	2	11	..

* Second-class boat No. 83 lost off Cape de la Chèvre, 1897, and No. 133 near Algiers, 1898.

† For the torpedo-transport Foudre.

The Libellule, a turbine-motor torpedo boat, is in hand at Cherbourg. Twenty submarine boats are to be put in hand—10 at Toulon, 6 at Rochefort, and 4 at Cherbourg.

Germany.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
D 1, D 2 (2 boats)	Elbing ..	1887	180·6	21·6	9·8	2	250	1,800	19	6 1-pr. revs.	3	48	50
D 3, D 4 (2 boats)	Elbing ..	1888	184	21·8	9·6	2	300	2,000	20	4 6-pr. Q.F. 2 1-pr. revs.	3	48	90
D 5, D 6 (2 boats)	Elbing ..	1888–9	190·3	23	9·6	2	320	3,000	22½	4 6-pr. Q.F. 2 1-pr. revs.	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190·3	23	9·9	2	350	3,500	22½	6 Q.F.	3		
D 9	Elbing ..	1894	197·0	24·3	9·9	2	380	4,500	26	6 Q.F.	3		
D 10	Chiswick ..	1898	211·9	19·6	8·1	2	310	5,800	28·5	5 3-pr. Q.F.	3	52	80
D 11, D 12	Chiswick ..	1900	218·6	20 9	8·7	2	333	7,000	31	1·12 pr. 5·6 prs.	2	54	40
S 96–101	Elbing ...	1900	206·8	23	..	2	350	6,000	27·5	3 3-pr. Q.F.	3		
G 102–107	Kiel(Germania)	Bldg	206·8	23	..	2	350	6,000	27·5	3 3-pr. Q.F.	3		
Taku *	Elbing ..	1898	193·7	21·0	..	2	280	6,000	35	6·3 prs.	2	..	67
FIRST CLASS—													
S 1—S 65 (64 boats)†	Elbing ..	1883–92	121 150	15·7 15·6	6·7 6·7	..	85–88	900 1,600	20–22½	2 1-pr. revs.	2	..	17
S 66 –S 73 (10 boats)	Elbing ..	1893	154·3	16·4	..	2	110 145	1,600	..	..	3		
S 74—S 81 (8 boats)	Elbing ..	1894	154·3	16·4	..	2	125	1,900	25	..	3		
S 82 –S 87 (6 boats)	Elbing ..	1897–8	158·2	16·9	9·0	2	140	2,300	26	2 1-pr. revs.	3	..	32
G 88—G 89 (2 boats)	Kiel(Germania)	1898	154·3	16·5	..	..	160	2,500	26	2 mach.	3	22	
G 90—G 95 (6 boats)	Elbing ..	1899	157·5	16·9	8·9	2	155	..	25	1 Q.F., 1 m.	3	..	30
V 1. V 2 (2 boats)	Stettin ..	1884	124·6	..	..	..	75 90	550 1,000	..	..	2		
V 3, V 4 (2 boats)	Stettin ..	1884	..	..	..	..			..	..	2		
V 5—V 10 (6 boats)	Stettin ..	1884	..	..	..	..			19	..	2		
G 1,	Gaarden ..	1885	124·6	15·7	6·6	..	88	1,000	19	2 1-pr. revs.	2	17	
Y 1,	Poplar ..	1884	120	12·5	5·5	1	65	650	19	2 1-pr. revs.	2	15	25
T 1, T 2 (2 boats)	Chiswick, &c.	1884	117·7	12·5	6·2	1	80	..	20	2 1-pr. revs.	2	15	22
H 1,	Kiel (Howaldt)	1886	..	..	..	..	80	1,000	20·2	2 1-pr. revs.	2		
K 1,	Kiel(Dockyard)	1887	118·1	13·4	5·9	..	85	1,000	22	2 1-pr. revs.	..	18	
SECOND CLASS—													
3 boats	..	1893	..	..	..	..	88	..	22				
2 boats	..	1893	..	..	..	..	90	..	3				
VEDETTE BOATS—													
13 boats	..	..	..	..	..	..	13·5	..	18				
2 boats	..	..	..	..	..	..	..	..	16				
1 boat	Chiswick ..	1884	63	8	4·3	1	..	..	15·5	1 mach.	2		

* Ex Hai Ching, captured from the Chinese at Taku, 1900. † S 41 lost 1895.

The Estimates of 1901 provide the initial expenditure for the building of a division of torpedo boats.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
6 boats	Stettin ..	1885	128	15·3	5·4	1	85	1,050	19	4 1-pr. revs.	..	20	20
6 boats	Poplar.. ..	1881	100	12	4·2	1	48	600	19	2 1-pr. revs.	2	12	9
4 boats	La Seyne ..	1880	72	13	5·5	1	52	225	..	..	..	..	10
5 boats	La Seyne ..	1881	89	11	3·1	1	35	500	17·5	..	..	..	5
2 boats	Poplar.. ..	1878	75	10·8	2·5	..	18	295	16·2	..	..	..	1·5
8 boats	..	..	..	..	..	..	21	..	16	..			
20 boats	Various ..	..	..	..	..	..	..	..	..	..	sp.	..	..

Italy.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Fulmine	Sestri (Odero)	1898	200	20·4	5·4	2	298	4,800	28	1 12-pr. 3 6-pr. Q.F.	3	43	60
Lampo, Freccia, Dardo, Strale, Euro, Ostro	Elbing (Schichau)	1899 1901	196·8	21·3	5·8	2	320	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	60
Nembo, Turbine, Aquilone, Borea, Meteoro, Tuono	Naples (Pattison)	Bldg.	208	19·4	6·3	2	330	6,000	30	1 12-pr. Q.F., 3 6-pr.	2	53	60
FIRST CLASS—													
5 boats: Aquila, Sparviero, Nibbio, Avvoltoio, Falco	Elbing ..	1888	152	17·2	7·9	2	130	2,200	26·6	2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev.	3	24	40
Nos. 78, 79 (2 boats)	Venice ..	1887	135	14	5·3	2	110	1,600	24	1 1-pr. Q.F., 1 1-pr. rev.	3	20	24
Pellicano	Sestri (Odero)	1899	157·4	19	14·8	2	147	2,700	25	2 3-prs.	2	28	24
Condore	Sestri (Ansaldo)	1898	154·3	16·8	6·9	2	136	2,500	27	2 3-prs.	2	27	16
SECOND CLASS—													
Nos. 76, 77 (2 boats)	Poplar ..	1887	140	14	5	2	100	1,600	25	2 3-pr. Q.F., 1 1-pr. rev.	4	20	24
Nos. 78, 79 (2 boats)	Venice ..	1896	..	..	..	..	..	..	..	..	3	20	24
Nos. 80–104, 106–111 (31 boats)	Elbing and Italy ..	1887–88	127·7	15·6	6·8	1	85	1,000	22·5	2 1-pr. Q.F	2	17	17
Nos. 112-116, 118-135 (23 boats)	Elbing and Italy ..	1889–92	127·7	15·6	6·8	1	85	1,100 1,200	23	..	2	17	17
No. 117	..	1895	131·2	16·4	..	1	85	1,000	..	2 1 pr. Q.F.	2	17	17
Nos. 136–146 (11 boats)	Italy	1893–94	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 147–153 (7 boats)	Italy ..	1894–5	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 60–75 (15 boats)	Elbing and Italy ..	1885–87	127·7	15·6	6·8	1	65	1,000	22·5	2 1-pr. Q.F.	2	17	17
THIRD CLASS—													
No. 22	Poplar	1882	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	7
No. 25	Poplar ..	1882	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	7
Nos. 26–59 (34 boats)	Chiswick and Italy ..	1882–86	100	11·7	5·3	1	34	430	21·3	1 1-pr rev.	2	11	7
Nos. 23, 24 (2 boats)	Chiswick ..	1881	92	10·5	4·9	1	33	470	21·8	1 1-pr. rev.	2	11	7
FOURTH CLASS.													
No. 1	Chiswick ..	1878	78·8	9·8	3	1	19	173	19	..	2	10	
No. 2	Poplar	1879	86	11	4·5	1	25	420	21	1 1-pr. rev.	2	10	
No. 18	Chiswick ..	1883	62·4	7·5	2·5	1	10	170	17	1 1-pr. rev.	2	10	
No. 11	Leghorn ..	1883	75·6	9·9	3·8	1	31	250	19·2	..	2	10	
SUBMARINE—													
Delfino	Spezia	1895	49·0	..	..	..	95/107	..	10·0	1 1-pr. rev.	2	8	

The new Italian destroyers have Thornycroft water-tube boilers.

Japan.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Murakumo	Chiswick ..	1898											
Shinonome	Chiswick ..	1898											
Yugiri	Chiswick ..	1898	210·0	19·5	7·2	2	285	5,800	30 to 30·55	1 12-pr., 5 6-prs.	2	54	80
Shiranui	Chiswick ..	1899											
Kagerou	Chiswick ..	1899											
Usugumo	Chiswick ..	1900											
2 unuamed	Chiswick ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..
Ikadsuchi	Poplar.. ..	1898											
Inadsuma	Poplar.. ..	1899	220·0	20·6	8·9	2	400	6,000	31·03 to 31·38	1 12-pr., 5 6-prs.	2	55	95
Akebono	Poplar.. ..	1899											
Sazanami	Poplar.. ..	1899											
Oboro	Poplar.. ..	1899	220·3	20·6	7·6	2	307	5,770	31·62	1 12-pr., 5 6-prs.	2	..	90
Niji	Poplar.. ..	1899	220·3	20.6	7·6	2	308	5,550	31 15	1 12-pr., 5 6 -prs.	2	..	90
2 unnamed	Poplar.. ..	Bldg.	220·3	20·6	7·10	2	320	6,000	31	1 12-pr. 5 6-pr	..	..	..
FIRST CLASS—													
Kotaka	Poplar.. ..	1886	170	19·6	5		190	1,400	19	4 mach.	6	..	
14 boats*	Creusot ..	1889	114·7	10·6	6	2	56	525	20	2 1-prs.	..	16	50
7 boats	Kobe	1889	114·7	10·6	6	1	56	525	20	2 1-prs.	..	16	
4 boats	Poplar.. ..	1879	100	12·5	..	1	40	620	20	..	..	..	
1 boat (No. 24) ..	Normand ..	1891	118	13·1	6·9	1	80	1,200	23	2 1-prs.	2	21	10
10 boats	Kobe	Bldg.	..	..	..	1	..	..	..	..	..	..	24
2 boats	Normand ..	1898	121·4	13·6	8·6	1	86	1,800	27	1 3-pr.	2	..	10
Kayabusa..	Normand ..	1898											
Kasasagi	Normand ..	1899	147·7	16·0	8 2	2	150	4,200	30	3 3-prs.	3		13
Manadzuru	Normand ..	1899											
Chidori	Normand ..	1900											
Shiratuka..	Elbing ..	1899	..	..	..	..	125	..	28	..	..	..	..
SECOND CLASS—													
16 boats	Elbing ..	1891–9	..	..	..	..	..	..	..	..	..	..	..

* No. 16 lost off the Pescadores, 1895.

The ten years' programme includes 23 first-class, 31 second-class, and 35 third-class torpedo-boats, and a 6750-ton torpedo transport.

Mexico.

Mexico has five first-class boats building or projected.

Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ardjoeno	Poplar.. ..	1886	125	13	6	1	83	80	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Poplar.. ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Etna	Poplar.. ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Hekla	Poplar.. ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Lamongan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Makjan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Nobo	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Scylla	Poplar.. ..	1900	130	13·6	6·0	1	77	1,200	24.3	2 1-prs.	3	18	20
Hydra	Poplar.. ..	1900	130	13·6	6·0	1	77	1,200	24 4	2 1 prs.	3	18	20
Ophir	Poplar.. ..	1901	152·6	15·3	7·8	1	130	18,000	23	2 3-prs.	2	25	32
Pangrango	Poplar.. ..	1901	152·6	15·3	7·8	1	130	18,000	23	2 3-prs.	2	25	32
Rindjani	Poplar.. ..	Bldg.	152·6	15·3	7·8	1	130	18,000	23	2 3-prs.	2	25	32
SECOND CLASS—													
Nos. 1, 2, 4–20 (19 boats)	Chiswick, etc.	1878–86	76 / 79	10·3	5·2	1	29	250	18	1 1-pr.	2 sp	..	3
Nos. 3,21,2 (3 boats)	..	1890	83·6	10·5	5·1	1	37	460	17·9	1 1-pr.	1	..	3
1 boat	East Cowes	1883	45·5	9·7	..	1	..	..	12	1 mach.	1		
INDIAN FLEET—													
Cerberus	Flushing ..	1888	125	13	6·9	1	83	912	21·2	2-1 prs.		16	
1 boat	..	1891											
3 boats	..	1893–94	125	..	..	..	83	..	21·5	..	2		

All the Poplar destroyers have Yarrow Water-tube boilers.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Lyn	..	1882	94·2	9·7	2·5	1	36	430	18	..	1	..	3
Od	..	1882	97·5	11	5·6	1	40	450	18	..	1	..	3
Orm, Otter (2 boats)	..	1887	108·2	12·2	5·6	1	40	500	20	..	2	..	3
Pil, Rask (2 boats)..	..	1887	101·7	11·8	5·6	1	40	500	20	..	2	..	3
Snar	..	1887	104·9	11·8	5·6	1	40	500	20	..	2	..	3
Springer	..	1887	97·5	11·6	5·6	1	40	450	19	..	2	..	3
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing ..	1896	128·0	15·0	..	1	84	1,100	24·5	2 1·4-in. Q.F.	2	..	..
Storm, Ovrand, Trods	Christiania ..	Bldg.	128·0	15·0	..	1	84	1,100	23	2 1·4-in. Q.F.	2		
SECOND CLASS—													
Rasp	Chiswick ..	1873	58	7·5	3·9	1	16	..	18	..	2		
Ulven	..	1878	56	..	..	1	16	..	9	..	sp.		
2 boats	..	..	..	..	..	..	20	..	12	..	..		

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats (5–9)	Elbing ..	1890–92											
Espadarte (1)	Poplar.. ..	1881	85	11	5	1	31	450	19·7	2 mach.	2	10	10
Nos. 2, 3, 4 (3 boats)	Poplar.. ..	1886	120	12·5	5·5	1	60	700	20	2 mach.	2	16	18
Fulminante	Blackwall ..	1880	75	15	2·6	2	40	150	11·5	2 mach.	..	..	8
1 boat	..	..	..	..	..	..	25						
Mineiro	Lisbon ..	1893	..	..	..	..	..	..	12				
SUBMARINE—													
Plongeur	..	1892	72·1	11·5	..	..	..	..	6				

Roumania.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naluka	Havre.. ..	1888	120·7	11·3	6·9	1	55	500	21	1 1-pr. rev	2	..	12
Sborul	Havre.. ..	1888	120·7	11·3	6·9	1	..	500	21	1 1-pr. rev.	2	..	12
Smeul	Havre.. ..	1888	120·7	11·3	6·9	1	..	500	21	1 1-pr. rev.	2	..	12
SECOND CLASS—													
Szimul	Poplar.. ..	1882	63	8	3	1	15	150	16·5	..	..	8	1
Vulturul	Poplar.. ..	1882	63	8	3	1	15	150	16·5	..	..	8	1

Russia.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC SEA.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYER—													
Sokol	Poplar	1895	190	18·6	7.0	2	240	4,400	29.7	1 12-pr. 3	2		
Krechet, Korshun (2 boats)	Abo	1898	198 10	18 6	7·0	2	240	3,800	27·5	6-pr.			
Iastreb	Ishora	1898	196·9	18·4	11·5	1	240	3,800	27	1 2·8-in.	2		
Nyrok	Ishora	1898	196·9	18·4	11·5	1	240	3,800	27	3 1·8-in.	2		
Berkout	Ishora	1898	196·9	18·4	11·5	1	240	3,800	27	3 1·8-in.	2		
Condor	Ishora	1898	196·9	18·4	11·5	1	240	3,800	27	3 1·8-in.	2		
5 boats	Ishora	Bldg.											
Kit, Skat, Delphin, Kassatka (4 boats)	Elbing	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	2		
Ossetr, Kephal, Losos	Havre (F.&C.)	1900–1	186·0	20·8	10·3	2	300	5,000	27	1 12-pr, 5 3-pr	2	..	80
Forel, Sterliad	Havre (Normand)	1900–1	186·0	20·8	10·3	2	300	5,000	27	1 12-pr, 5 3-pr	2	..	80
Gagara, Voron, Filin, Sova	Nevsky	1899	..	...	..	1	240	..	29	1 12-pr, 5 3-pr	..	55	53
Som	Birkenhead	1899	213	21·5	12·9	1	370	6,000	28				
Lebed, Pelikan, Pavlin, Fasan	Creighton												
Drozd, Dlatel, Baklan, Bekass, Gorlitza, Gratch, Kulik, Perepel, Skvoretz, Strige, Shtchegol	Nevsky and Ishora	Bldg.											
X ‡Taku	Elbing	1898	193·7	21·0	..	2	280	6,000	35	6 3-pr. Q.F.	2	..	67
FIRST CLASS—													
Aspen	Ishora	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Abo	Elbing	1886	128	15·7	7·5	1	87	900	22·2	4 1-pr. revs.	2	13	17
Bjerke	Putiloff	1890	136·5	13	7·8	..	81	1,100	21				
Dago	Abo	1891	152	13	8·3	..	100	1,000	19				
Domeness	Putiloff	1895	127 9	15·7	6·9	1	98	1,250	21	..	2	..	17
Eckness	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Hapsal	Putiloff	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Hogland	Ishora	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Kotka	Abo	1891	152	13	8·3	..	100	1,000	19				
Kotlinj	St. Petersburg	1885	124·2	12·9	5·9	2	67	500	16·5	2 1-pr. revs.	2	16	15
Kronschlot	Ishora	1891	152	13	8·3	..	100	1,000	19				
Lachta	Elbing	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Libawa	Elbing	1886	128	15·7	7·5	1	87	1,000	22	4 1-pr. revs.	2	13	17
Louga	Elbing	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Moonsund	Putiloff	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Nargen	Ishora	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Narwa	Elbing	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Nyrok	Ishora	1898											
Pernoff	Normand	1892	137·9	14·9	6·8	2	120	1,600	25	2 3-prs.	2	26	16
Rochensalm	Putiloff	1890	136·5	13	7·8	..	81	1,100	21				
Seskar	Ishora	1891	152	13	8·3	..	100	1,000	19				
Sestoretsk	Normand	1894	118	13·2	8·6	1	80	1,300	24	2 1-prs.	2	21	10
Tosna	Putiloff	1893	127·9	15·7	6·9	1	98	1,250	21	..	2	13	17
Transund	Ishora	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Viborg	Clydebank	1886	144·5	17	8·1	2	126	1,400	20	2 3-pr. revs.	3	24	45*
Vindawa	Elbing	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17
Vzriw	St. Petersburg	1877	118	16	10·9	1	160	800	14·5	4 Q.F.	1	18	16
8 boats	St. Petersburg	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
2 boats	Putiloff	1894	138	14·7	9·9	2	118	..	25	2 mach.	2	26	
2 boats	St. Petersburg	1896	128	16	6·9	2	85	1,200	22	2 1-prs.	2	13	17
6 boats	St. Petersburg	1897	138	14·7	9·9	2	120	..	25	..	2	26	
†8 boats	St. Petersburg	1898	..	..	..	..	118						
3 boats	Nicolaieff	1898											
5 boats	Nicolaieff	Pro.	..	..	..	..	150	..	..	..	..	..	..
5 boats	Abo	Pro.	..	..	..	..	150	..	..	..	..	..	..
SECOND CLASS—													
21 boats (Galka class)	Elbing and Russia	1880 &c.	74·7	8·9	5	1	30	220	16	..	2	14	3
21 boats (Woron class)	Elbing and Russia	..	66	11·1	..	1	..	260	17				
1 boat	Poplar	1888	60	8·5	3	1	16	240	17·5	..	2	..	1
BLACK SEA.													
FIRST CLASS—													
A. B. C. (3 boats)	Nicolaieff	1893	126	..	..	..	81	..	21				
Adler	Elbing	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1-prs.	3	24	40
Anakria	Elbing	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Aitodorj	Odessa	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Batoum	Poplar	1880	100	12·5	5·5	1	40	500	22	2 1-pr. revs.	2	12	9
D. E. (2 boats)	Sebastopol	1893	128	..	..	..	85	..	22				
Gagri	Claparède	1883	120·6	13·3	7	1	78	600	18	2 1-pr. revs.	2	13	12
Gelendshik	La Seyne	1883	122·7	12·4	6·2	1	73	560	18	2 1-pr. revs.	2	13	11
Ismail	Nicolaieff	1886	128	15·7	7·5	1	87	900	20	2 1-pr. revs.	2	13	17
Itzvar	Odessa	1891	..	..	..	..	81	1,100					
Kodor	Elbing	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17

* Has received liquid fuel apparatus. † Of the Pernoff type, building on the Neva. ‡ Captured from the Chinese at Taku, 1900

Russia—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BLACK SEA—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
FIRST CLASS—*contd.*													
Kilia	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Novorossisk	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr revs.	2	13	17
Poti	Normand ..	1883	124·8	11·0	7·0	1	62	550	18	2 1-pr. revs.	2	13	10
Reni	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Sookhoum	Chiswick ..	1883	113	12·5	6	1	64	700	19.5	2 Nords.	2	13	10
Tchardak	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Yalta	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
3 boats	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
4 boats	Nicolaieff ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..
SECOND CLASS—													
Istcheritza	Sebastopol ..	1878	62·3	9·7	3·9	1	24	220	15	..	..	10	
Karabin	Elbing	1877	64·3	8·4	2	1	11	120	15	..	..	8	
Kefal	Chiswick ..	1880	60·5	7·5	3·5	1	..	..	16·8	..	..	8	
Scheglensk	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Schehouka	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Scoombia	Odessa	1878	64·3	10	4	1	25	220	15	..	..	10	
Soroka	St. Petersburg	1878	62.3	9·7	3·9	1	24	220	15	..	..	10	
Soulin	..	1877	60	9·7	3·9	1	24	210	15	..	..	10	
Sultanka	Odessa	1878	64·3	10	4	1	25	220	15	..	.	10	
1 boat	Poplar	1877	75	10	..	..	..	..	..	..	..	..	
50 boats (Woron Class)	Elbing, etc.	..	66	11·1	..	1	..	260	17				
SIBERIAN FLOTILLA.													
Borgo	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Forel	..	..	71·5	6·5	3·3	1	23	220	16				
Jantchiche	Elbing	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
Podorosnik	..	..	71·5	6·5	3·3	1	23	220	16				
Revel	Normand ..	1886	151	12·5	8·4	1	102	800	20	2 1-pr. revs.	2	23	15
Sisik	..	..	71·5	6·5	3·3	1	23	220	16				
Skorpion	..	..	71·5	6·5	3·3	1	23	220	16				
Sootchena	Elbing	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
Sterliad	..	..	71·5	6·5	3·3	1	23	220	16				
Strauss	..	..	71·5	6·5	3·3	1	23	220	16				
Sunguri (*ex* Hogland)	Abo	1890	152	16	7·9	2	140	1,800	22				
Sweaborg	Normand ..	1886	151	12·5	8·4	1	102	800	20	2 1-pr. revs.	2	23	15
Ussuri (*ex* Nargen)	Abo	1890	152	16	7·9	2	140	1,800	22				
2 Unnamed	Ochtenski ..	Bldg.	152	16	7·9	2	140	1,800	22				

Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Terror	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr.. 1-pr.	2	67	100
Audaz, Osado, Proserpina	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 2 1-pr.	2	70	90
FIRST CLASS—													
Acevedo	Chiswick ..	1885	117·7	12·5	6·2	1	63	660	20·1	2 mach.	2		
Ariete	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	26·1	4 3-pr. Q.F.	2	..	25
Azor	Poplar	1887	134·5	14	6	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Bustamente	Normand ..	1887	126	10·9	..	..	63	800	..	3 3-prs.	2		
Ejercito	Kiel	1887	111·5	13	3·3	..	60	1,000	25	2 mach.	2		
Habana	Chiswick ..	1887	127·5	12·5	6	1	59	730	21·3	1 mach	2		
Halcon	Poplar	1887	134·5	14	..	1	108	1,600	24	4 3-pr. Q F.	3	23	25
Julian Ordoñez ..	Chiswick ..	1885	117·7	12·5	6·2	1	65	660	20·1	2 1-in. Nord.	2		
Orion	Gaarden ..	..	125	15·5	3·5	1	85	1,000	21·5	2 1-pr. revs.	2	18	16
Rayo	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	25·5	4 3-pr. Q.F.	2	..	25
Retamosa	Poplar	1886	118	12·5	5·5	1	70	700	20·5	2 1-in.	2	17	20
Rigel	Bremen ..	1883	105	12·3	3·3	1	57	..	19	1 1-pr. rev.	2	18	13
Seza	Ferrol	1885	126	..	..	..	85	..	14				
4 boats	..	Bldg.	147	43.0	5	..	98	1,600	25			25	25
2 boats	Clydebank ..	Bldg.	..	..	..	..	..	..	28				
SECOND CLASS—													
Aire	Spain	1883	43·4	10·2	3	2	25	175	8	1 3·1-in.	..	16	1
Castor	La Seyne ..	1878	76·2	9·7	2·3	..	23	265	19	..	..	14	1·5
Pollux	Poplar	1879	84·5	10·7	4·6	..	33	450	19·5	..	2	14	9
VEDETTE BOATS—													
3 boats	East Cowes	1892	60	9·3	..	..	..	..	18.3				
Peral	Carraca ..	1889	70	8·5	..	2	87	60	10				

It is stated that the Ejercito, Retamoso, Rigel, and Castor have been condemned.

Sweden.

Torpedo Boats.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F.	2	16	17
Blixt..	Carlskrona..	1898	128	15·9	6·11	1	92	1,260	23·5	2 1·9-in. Q.F.	2	18	17
Meteor	Carlskrona..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F	2	18	17
Stjerna	Carlskrona..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Vind..	Carlskrona..	1900	128	15 9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Bris	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1.5-in. Q.F.	2	18	17
2 boats (A and B) ..	Carlskrona..	Bldg.	128	15·9	6·11	1	92	1,250		2 1·5-in. Q.F.	2	18	17
No. 1..	Chiswick ..	1884	113·2	12·2	6·3	1	65	620	18·5	1 mach.	2	16	11
2 boats (3 and 5) ..	Stockholm ..	1887	114·2	12·6	6·7	1	67	620	18·5	1 mach.	2	16	15
No. 7..	Stockholm ..	1887	114·2	12·6	6·7	1	67	620	18·7	1 mach.	2	16	15
2 boats (9 and 11) ..	Carlskrona..	1894	126·8	13·11	7·7	1	86	850	19·5	2 mach.	2	16	15
Second Class—													
No. 61	Stockholm ..	1882	91·6	11·8	5·7	1	40	350.	16·0	1 mach.	1	14	9
No. 63	Chiswick ..	1883	100·1	11·10	5·11	1	45	420	19·0	1 mach.	2	14	7
No. 65	Stockholm ..	1885	100·1	11·10	5·11	1	45	420	19·0	1 mach.	2	14	9
No. 67	Stockholm ..	1886	100·9	11·10	6·1	1	46	430	19.2	1 mach.	2	14	9
No. 69	Stockholm ..	1886	100·9	11·10	6·1	1	46	450	19·9	1 mach.	2	14	9
No. 71	Stockholm ..	1887	103·4	11·10	6·7	1	58	460	18·6	1 mach.	2	14	9
No 73	Stockholm ..	1887	103·4	11·10	6·7	1	58	460	18·6	1 mach.	2	14	9
No. 75	Stockholm ..	1892	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 77	Carlskrona..	1891	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 79	Stockholm ..	Bldg.	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 81	Stockholm ..	Bldg.	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
Third Class—													
Nos. 141, 143, 145, 147, 149 (5 boats) ..	Stockholm ..	1879 / 1890	55·0	10·7	4·1	2	21	80	10		2		1·5

Turkey.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Efshan	Gaarden ..	1894	187	21·6	..	2	270	200	25	6 1-pr. revs.	2		
Tajjar	Gaarden ..	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2		
First Class—													
A. B...	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2		16
Edjder (No. 10) ..	Gaarden ..	1890	152·7	18·9	7·4	2	150	2,200	23	5 3-prs. Q.F.	2		
1 boat	Constantinople	1889	140	16	6·9	2	120	1,800	23	5 1-pr. revs.	2		
5 boats	Gaarden ..	1889–90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
Timsah	London ..	1887	126	15	..	..	..	..	21·7				
5 boats	Elbing ..	1886	120·3	16·2	..	..	85	900	21	2 Nords.	2	20	10
4 boats	Constantinople	1886–89	100·3	11·8	5·5	1	42	550	19·5	2 mach.			
Tewfik	Normand ..	1885	100·7	13	5·5	1	42	550	20				
2 boats	La Seyne and Constantinople	1885	100·7	13	5·5	1	42	550	20·3	2 Nords.			
2 boats	Teddington	1887	124	15	..	..	..	..	22				
2 boats	Kiel	1892	127	..	..	..	..	..	22				
Submarine—													
Abdul Hamid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8
Abdul Medjid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8

United States.

Name.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
DESTROYERS—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
Bainbridge ..	Philadelphia	1900	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.*	2	64	139
Barry	Philadelphia	1900	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	139
Chauncey.. ..	Philadelphia	1900	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	139
Dale	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	139
Decatur	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	139
Hopkins	Wilmington	1900	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	150
Hull	Wilmington	1900	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	150
Lawrence.. ..	Weymouth, Mass.	1900	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Macdonough ..	Weymouth, Mass. ..	1900	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Paul Jones ..	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Stewart	Morris Heights	1900	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	139
Truxtun	Baltimore ..	1900	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Whipple	Baltimore ..	1900	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Worden	Baltimore ..	1900	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Bagley	Bath	1900	157 0	17 0	4 7	2	167	..	28	3 3-pr.	3	29	..
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,000	30	4 6-pr.	2	..	20
Barney	Bath	1900	157 0	17 0	4 7	2	167	..	28	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	..	28	3 3-pr.	3	29	..
Blakely	Boston ..	1900	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
De Long	Boston ..	1900	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 8	4 8	2	165	3,400	28·58	4 1-pr.	3	32	76
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,000	30	4 6-pr.	2	..	76
Foote..	Baltimore ..	1896	160 0	16 1	5 0	2	142	..	24·5	3 1-pr.	3	24	44
Goldsborough ..	Portland, Ore	1899	194 8	20 5	5 0	2	247·5	..	30	4 6-pr.	2	..	131
Nicholson ..	Elizabethport	1900	174 6	17 0	4 6	2	174	..	26	3 3-pr.	3	29	..
O'Brien	Elizabethport	1900	174 6	17 0	4 6	2	174	..	26	3 3-pr.	3	29	..
Porter	Bristol, R.I.	1896	175 0	17 8	4 8	2	165	..	28·63	4 1-pr.	3	32	76
Rodgers	Baltimore ..	1896	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	26	4 1-pr.	3	32	60
Shubrick	Richmond ..	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Stockton	Richmond ..	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Stringham ..	Wilmington	1899	225 0	22 0	6 6	2	340	7,200	30	7 6-pr.	2	..	120
Thornton	Richmond	1900	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Tingey	Baltimore ..	Bldg.	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Wilkes	Morris Heights	Bldg	175 0	17 6	4 8	2	165	3,000	26·25	3 3-pr.	3	29	70
Winslow	Baltimore ..	1897	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
SEA-GOING—													
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22·5	3 1-pr.	3	23	36
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22.5	3 1-pr.	3	..	..
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30·5	4 1-pr.	2	..	32
Ericsson	Dubuque, Iowa	1894	149 7	15 6	4 9	2	120	1,800	24	4 1-pr.	3	23	35
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22·5	3 1-pr.	3	..	..
Manly	Yarrow ..	..	..	..	..	..	..	..	..	..	..	..	..
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Somers	Schichau, Elbing ..	..	149 3½	17 5	..	2	145	..	..	..	..	..	..
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30·5	4 1-pr.	2	..	32
THIRD CLASS—													
Gwin..	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie ..	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·3
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
Stiletto (wood)	Bristol, R.I.	..	88 6	11 0	3 0	1	31	359	18·22	..	2	..	4
SUBMARINE—													
Adder	Elizabethport	Bldg.	63 4	11 9	..	1	120	160	8	..	1	..	..
Grampus ..	S. Francisco	Bldg.	63 4	11 9	..	1	120	160	8	..	1	..	..
Holland	Elizabethport	1896	54 0	10 3	..	1	74	45	8	1 dynamite	1	5	..
Moccassin ..	Elizabethport	Bldg.	63 4	11 9	..	1	120	160	8	..	1	..	..
Pike	S. Francisco	Bldg.	63 4	11 9	..	1	120	160	8	..	1	..	..
Plunger	Baltimore ..	1898	85 3	11 6	..	1	168	70	8	..	2	..	..
Porpoise	Elizabethport	Bldg.	63 4	11 9	..	1	120	160	8	..	1	..	..
Shark	Elizabethport	Bldg.	63 4	11 9	..	1	120	160	8	..	1	..	..

* Guns of Destroyers of this class are Driggs Semi-Automatic Quick-Firers.

The Barcelo and some other Spanish torpedo-boats were captured during the war.

With the exception of the Lawrence Macdonough and Stewart, all the destroyers in the first alphabetical list have Thornycroft water-tube boilers. The Farragut, Goldsborough and Stringham have also boilers of this type.

PLANS

OF

BRITISH AND FOREIGN SHIPS.

SCALE FOR FULL-PAGE PLATES
50 FEET TO THE INCH

SCALE FOR HALF-PAGE PLATES.
100 FEET TO THE INCH

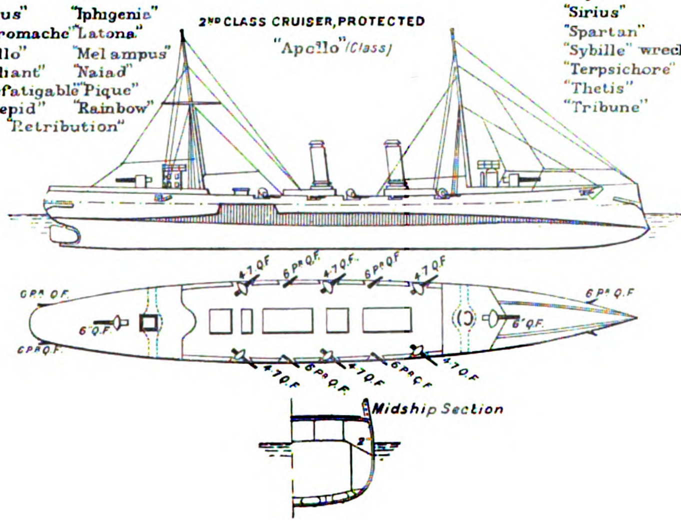
GREAT BRITAIN.

"Æolus"
"Andromache"
"Apollo"
"Brilliant"
"Indefatigable"
"Intrepid"
"Iphigenia"
"Latona"
"Melampus"
"Naiad"
"Pique"
"Rainbow"
"Retribution"

2ND CLASS CRUISER, PROTECTED

"Apollo" (Class)

"Sappho"
"Scylla"
"Sirius"
"Spartan"
"Sybille" wrecked
"Terpsichore"
"Thetis"
"Tribune"



"Astræa"
"Bonaventure"
"Cambrian"
"Charybdis"
"Flora"
"Forte"
"Fox"
"Hermione"

2ND CLASS PROTECTED CRUISERS

"Astræa" (Class)

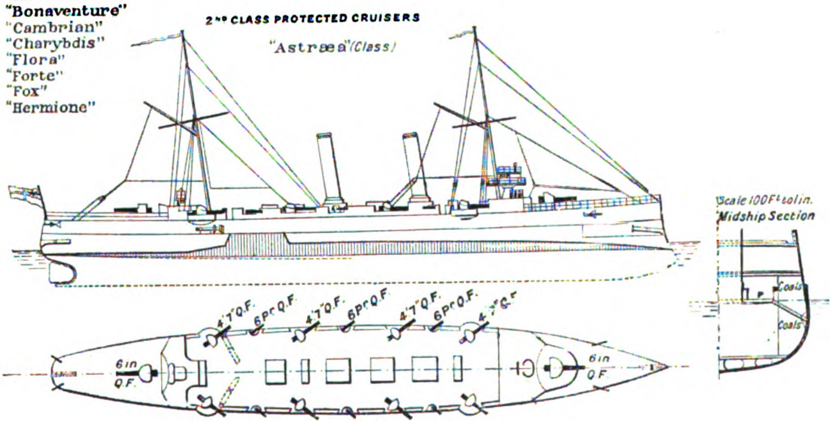


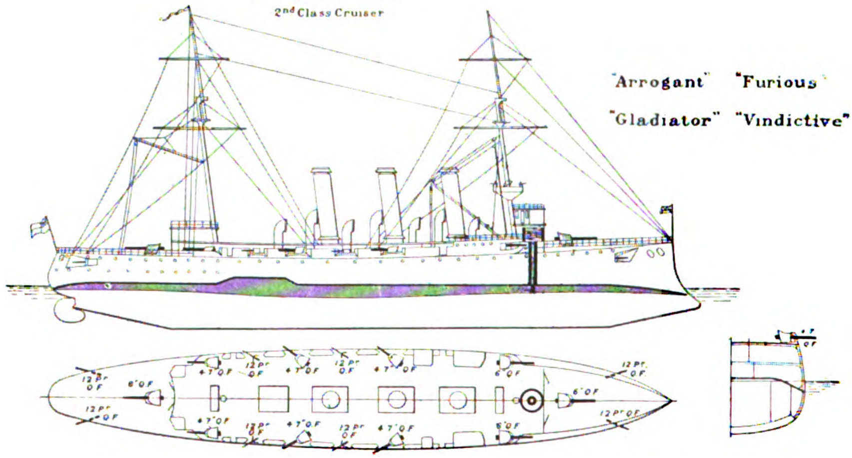
PLATE 1.

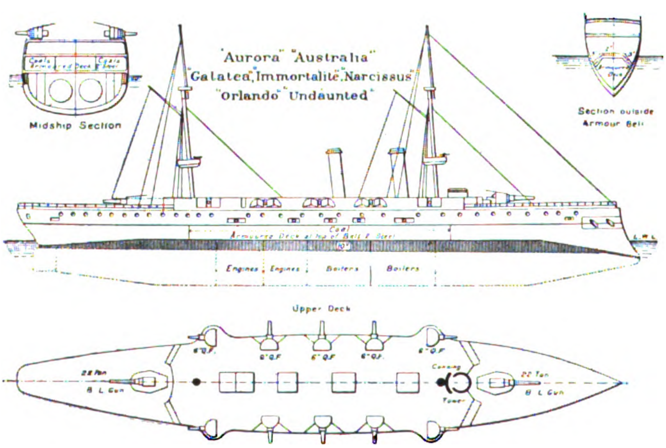
b

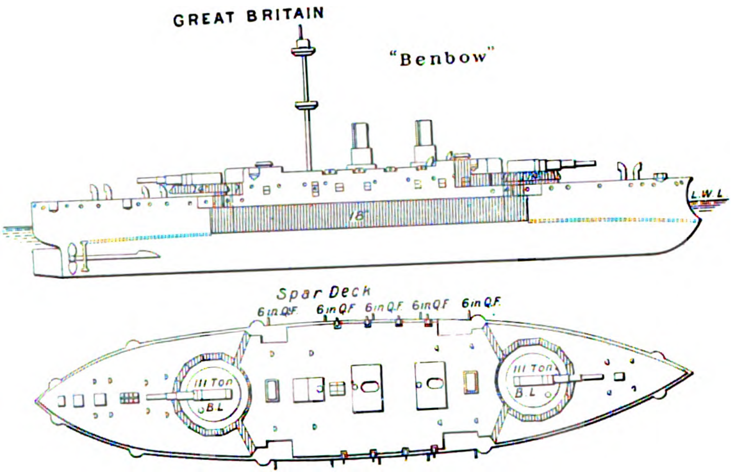
GREAT BRITAIN

"Arrogant" Class.

2nd Class Cruiser






GREAT BRITAIN
"Benbow"
L.W.L.
18"
14
Spar Deck
6 in Q.F.
6 in Q.F.
6 in Q.F.
6 in Q.F.
6 in Q.F.
111 Ton B.L.
111 Ton B.L.

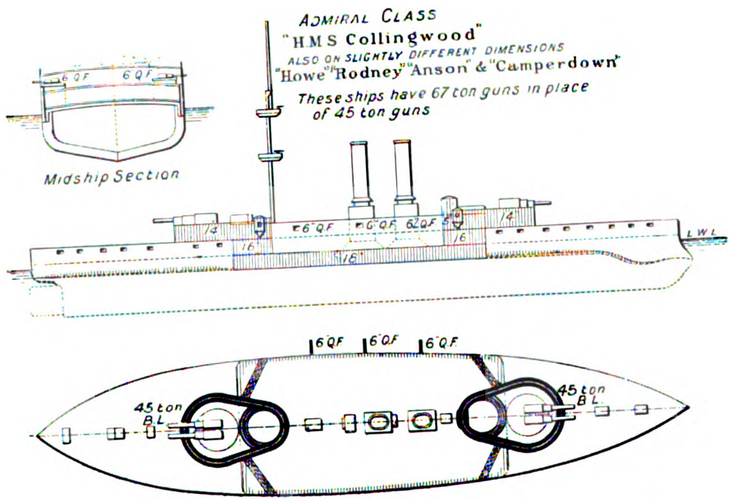
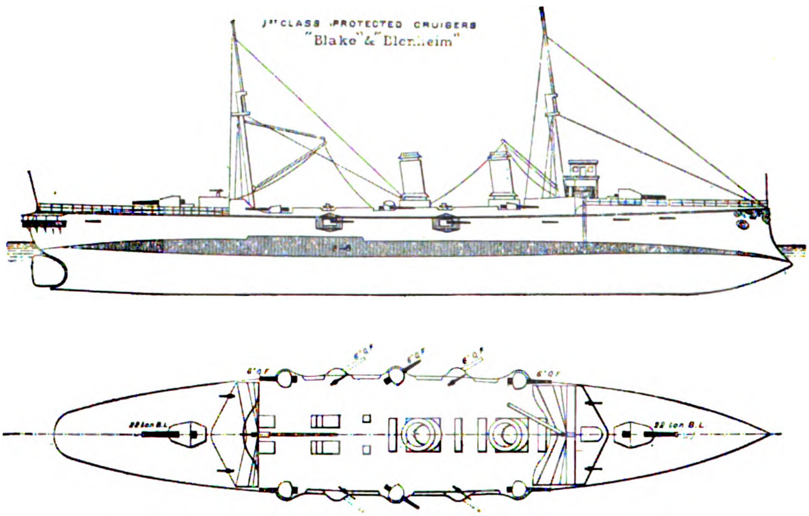
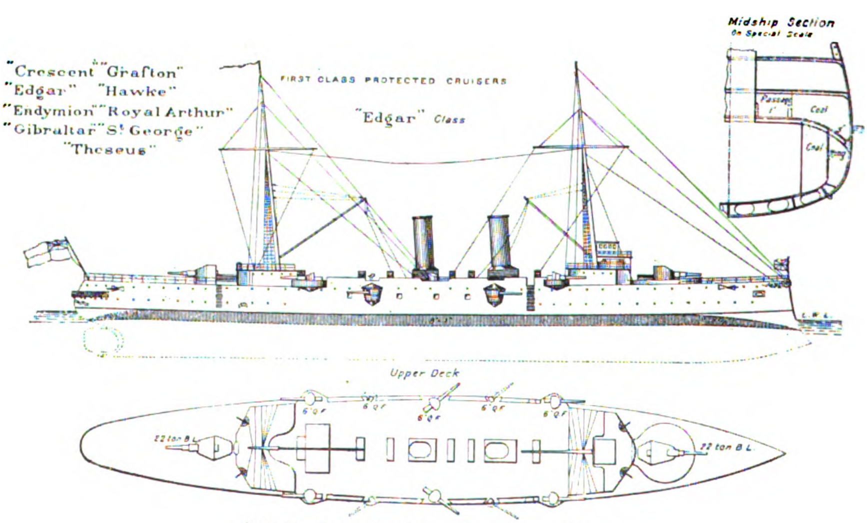

ADMIRAL CLASS
"H.M.S. Collingwood"
ALSO ON SLIGHTLY DIFFERENT DIMENSIONS
"Howe" "Rodney" "Anson" & "Camperdown"
These ships have 67 ton guns in place of 45 ton guns
6" Q.F.
6" Q.F.
Midship Section
L.W.L.
14
16
6" Q.F.
6" Q.F.
6" Q.F.
18"
16
14
6" Q.F.
6" Q.F.
6" Q.F.
45 ton B.L.
45 ton B.L.

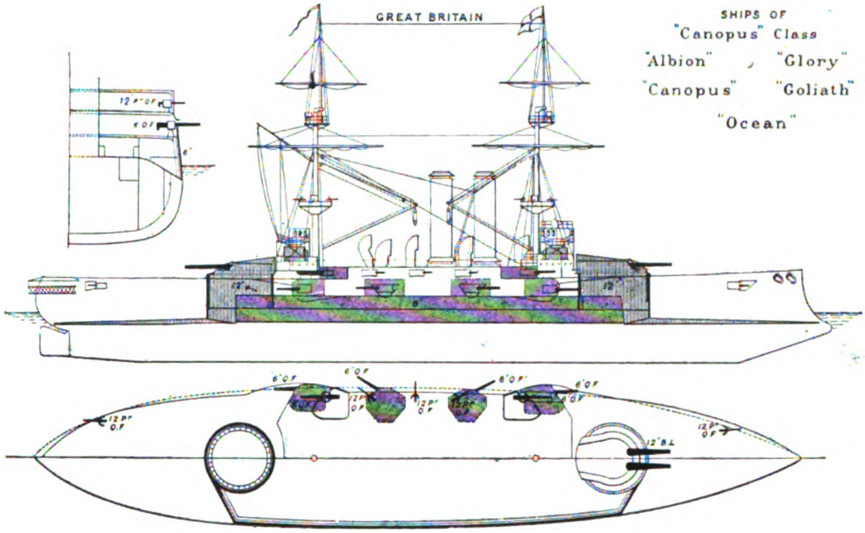
PLATE 3.

GREAT BRITAIN





Note. The Crescent and Royal Arthur have two 6 in guns forward in place of the 22 ton gun.


GREAT BRITAIN
SHIPS OF
"Canopus" Class
"Albion" "Glory"
"Canopus" "Goliath"
"Ocean"

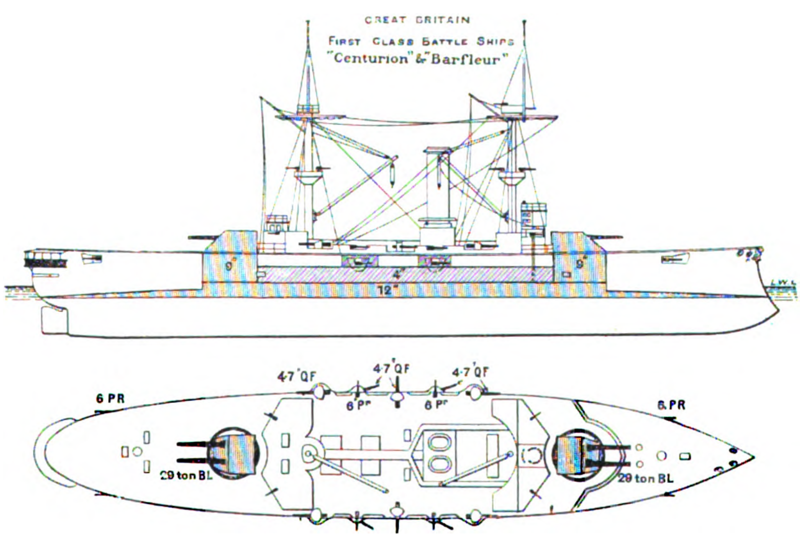
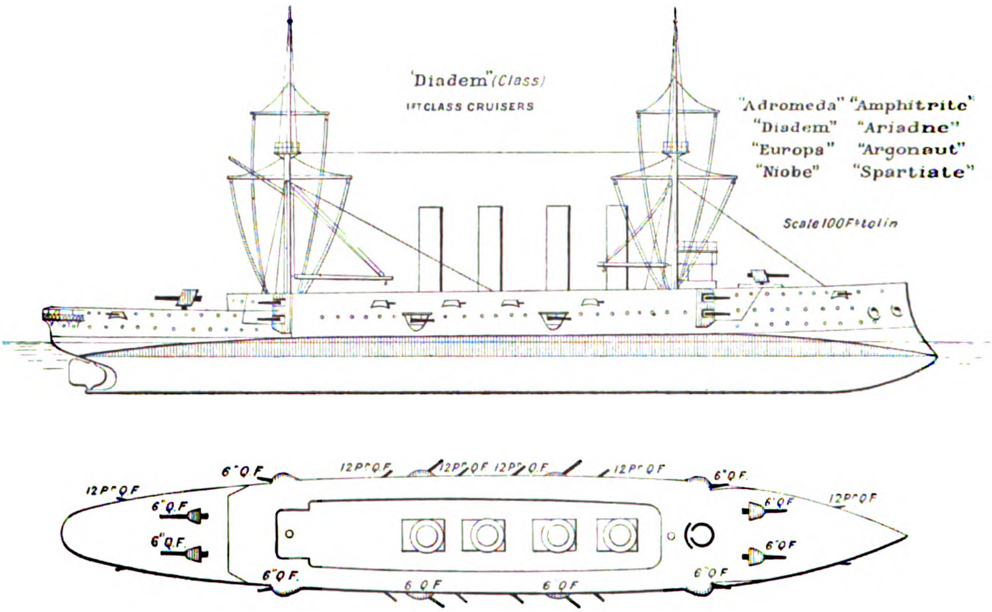

GREAT BRITAIN
FIRST CLASS BATTLE SHIPS
"Centurion" & "Barfleur"
4·7 QF
6 PR
29 ton BL

PLATE 5.

GREAT BRITAIN



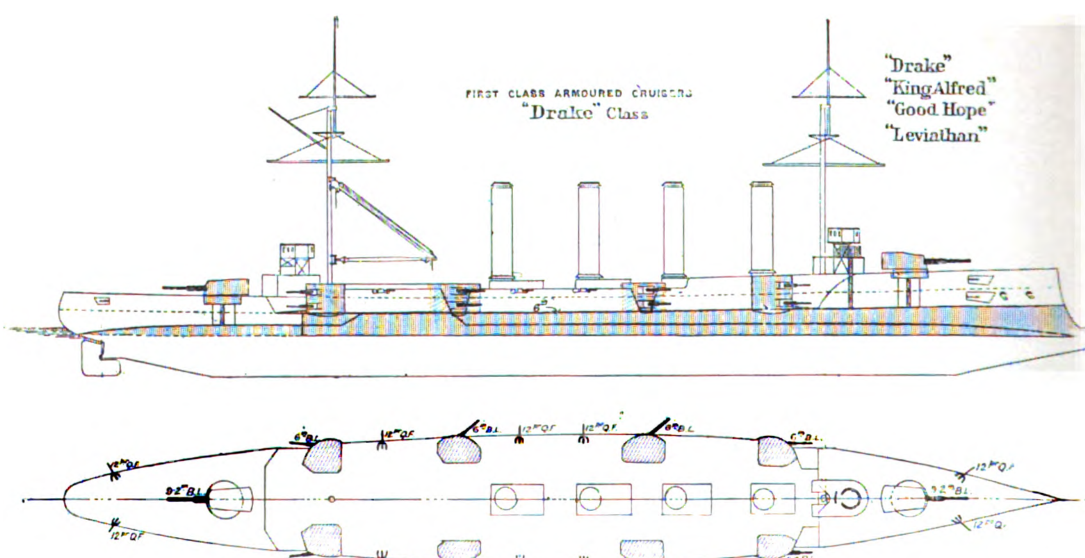


Plate 6.

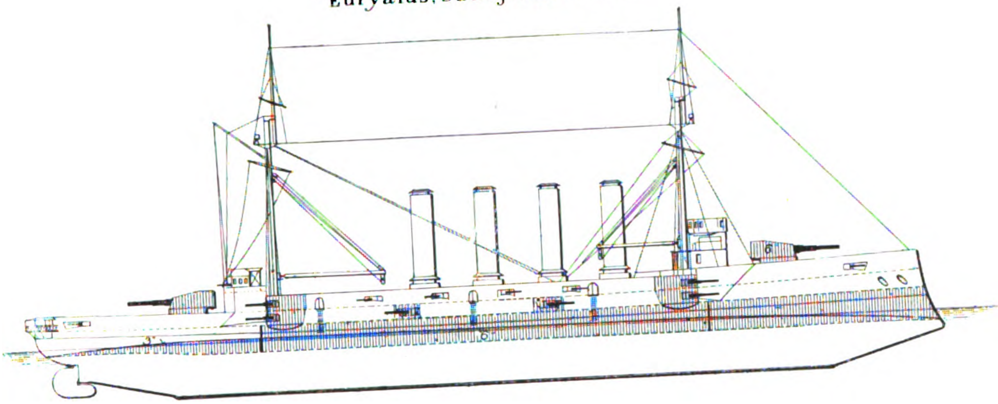
GREAT BRITAIN

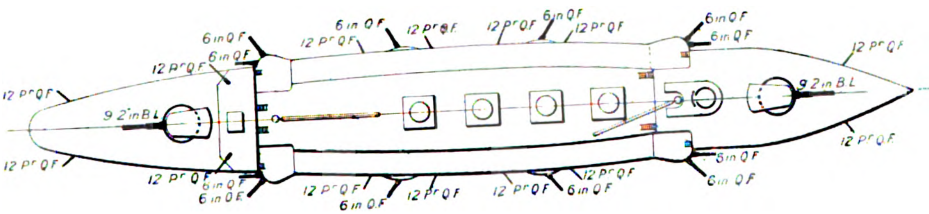
FIRST CLASS ARMOURED CRUISERS OF THE

"CRESSY" CLASS

"Cressy", "Aboukir", "Hogue",

"Euryalus", "Sutlej", "Bacchante"

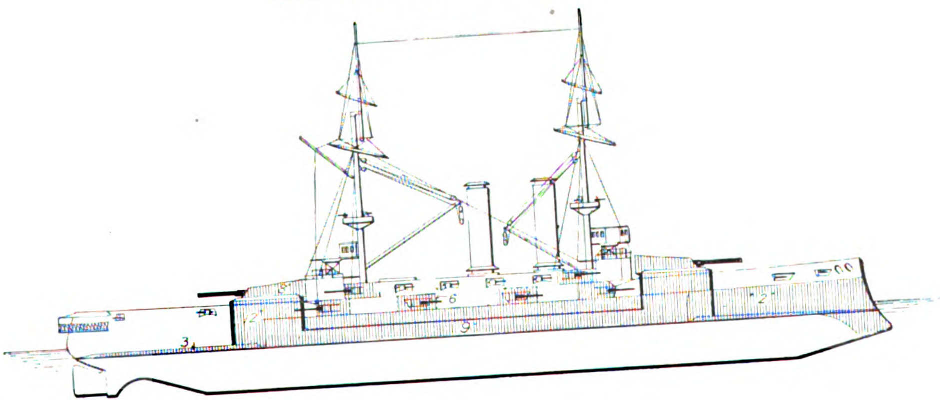




"FORMIDABLE" CLASS

"Formidable", "Irresistible", "Implacable",

"Bulwark", "London", "Venerable"



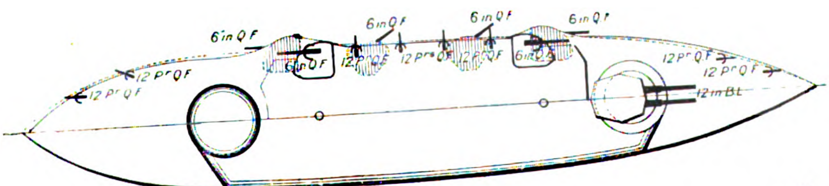
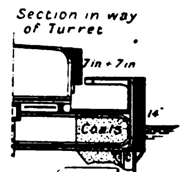
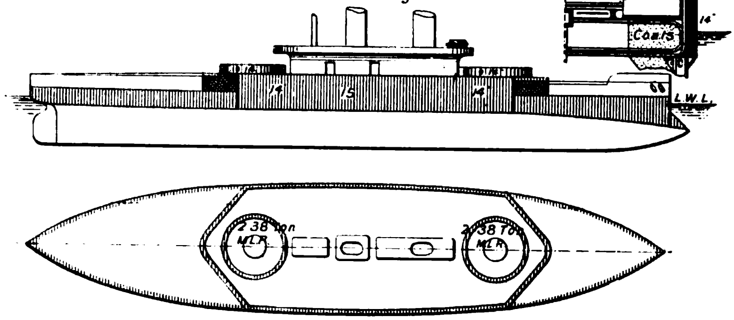


PLATE 7.

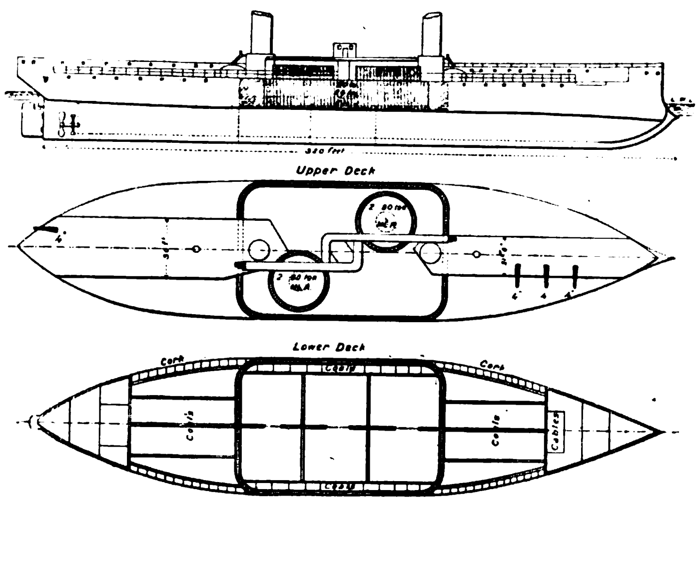
GREAT BRITAIN



"Dreadnought"



"Inflexible"



GREAT BRITAIN

FIRST CLASS BATTLE SHIPS.

"Duncan" Class

"Duncan"
"Cornwallis"
"Russell"
"Exmouth"
"Montagu"
"Albemarle"

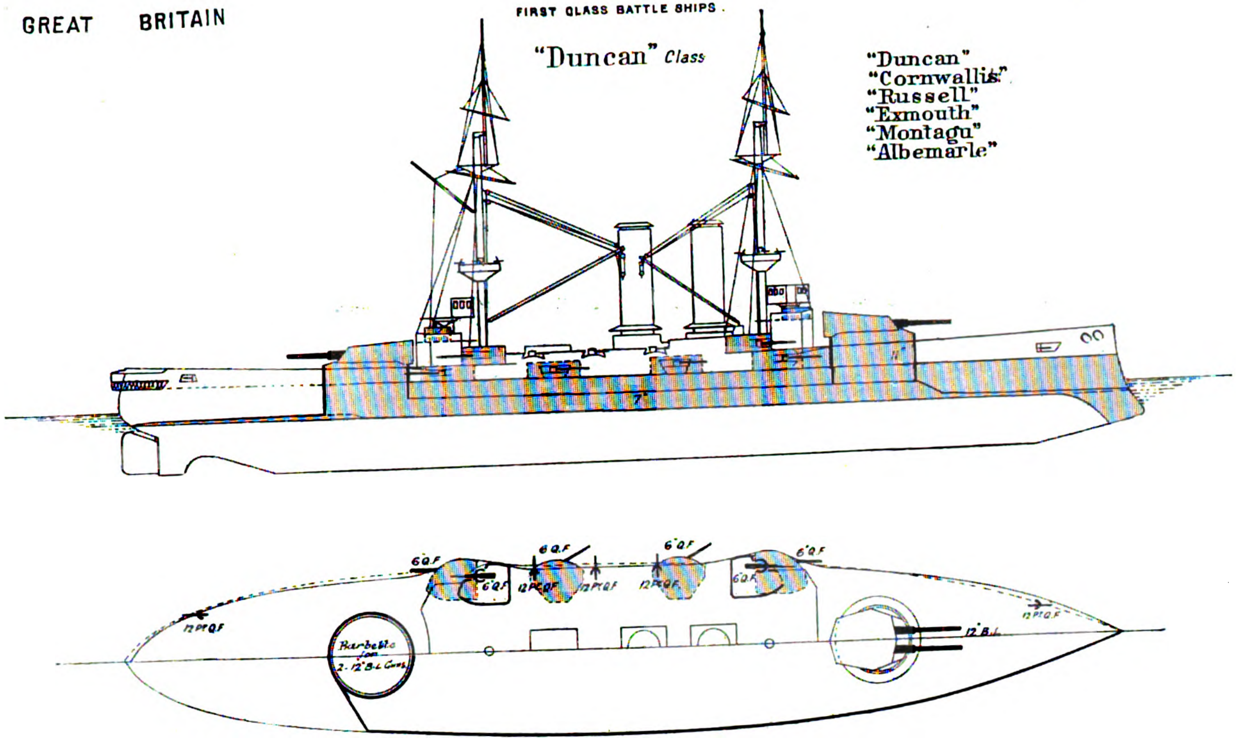
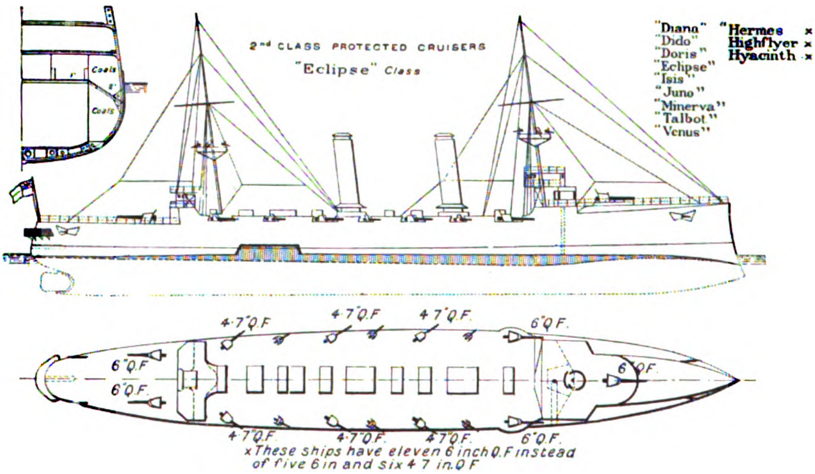
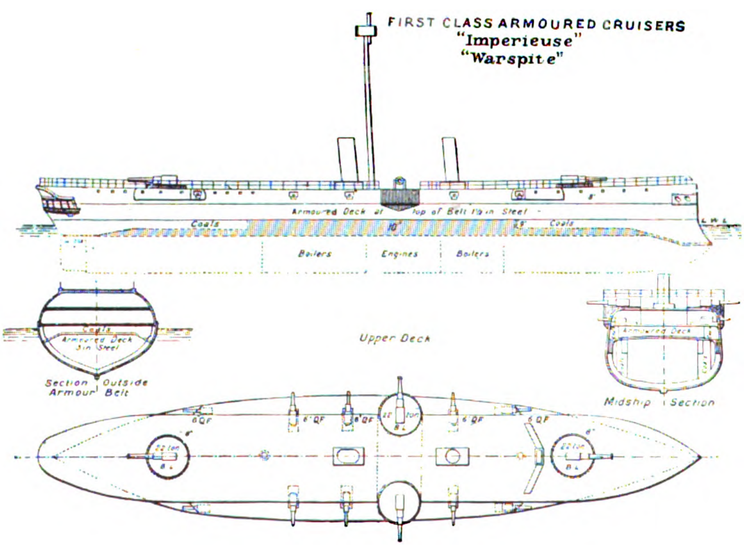


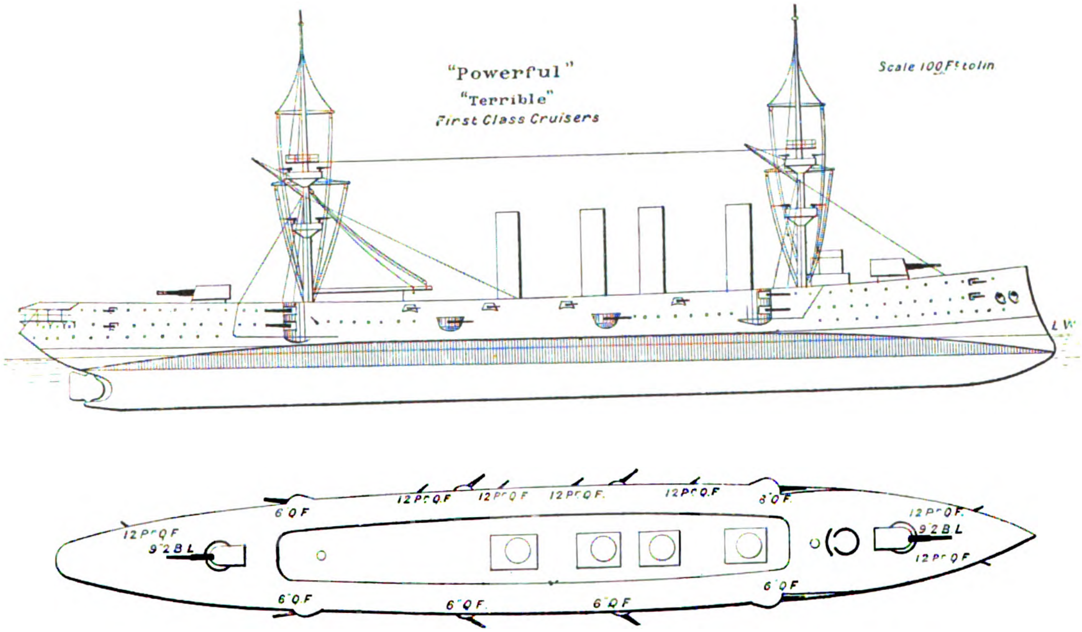
PLATE 9.

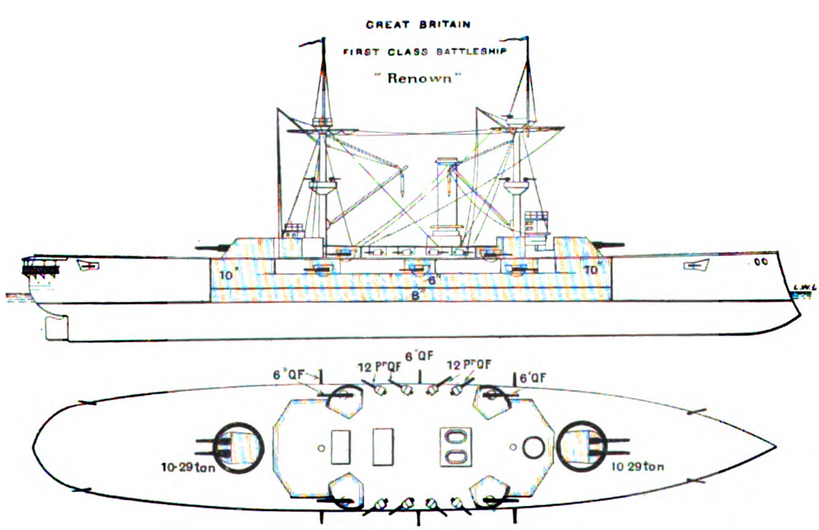
GREAT BRITAIN.



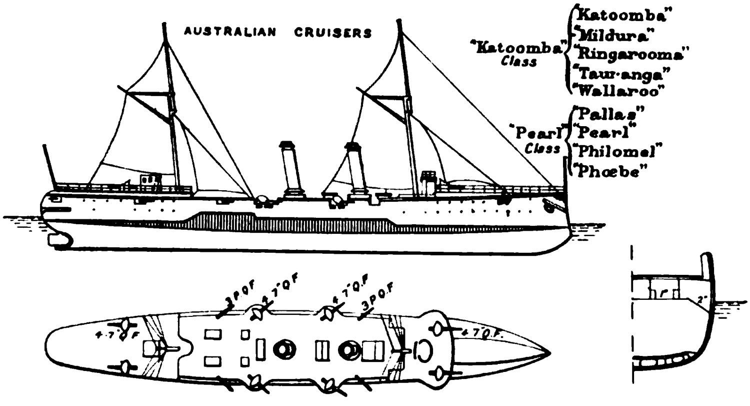


GREAT BRITAIN.



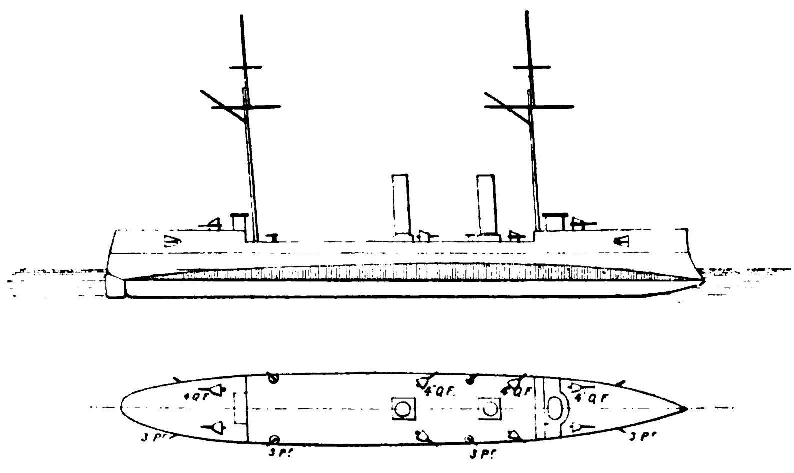


GREAT BRITAIN



Pelorus Class

Pelorus. *Pomone.*
Pactolus. *Prometheus*
Pegasus. *Proserpine.*
Perseus *Pyramus.*
Pandora *Psyche*
Pioneer



GREAT BRITAIN

FIRST CLASS ARMOURED CRUISERS

"Monmouth" Class

"Monmouth"
"Kent"
"Essex"
"Bedford"

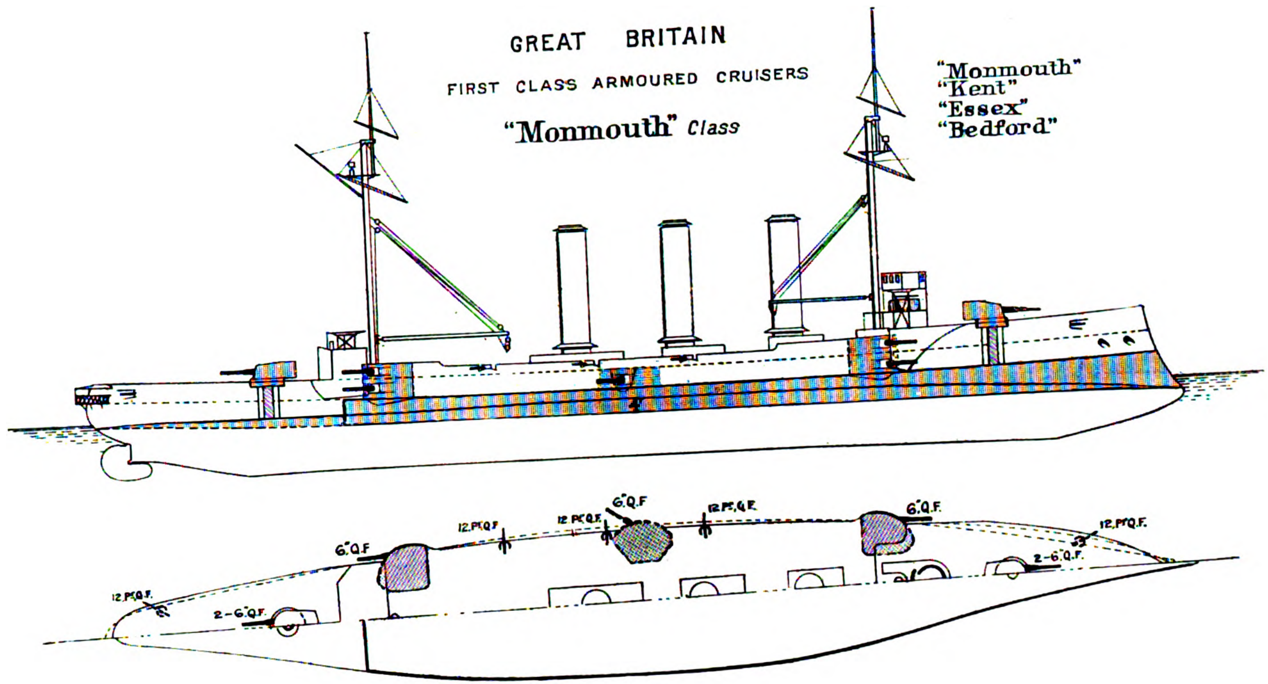
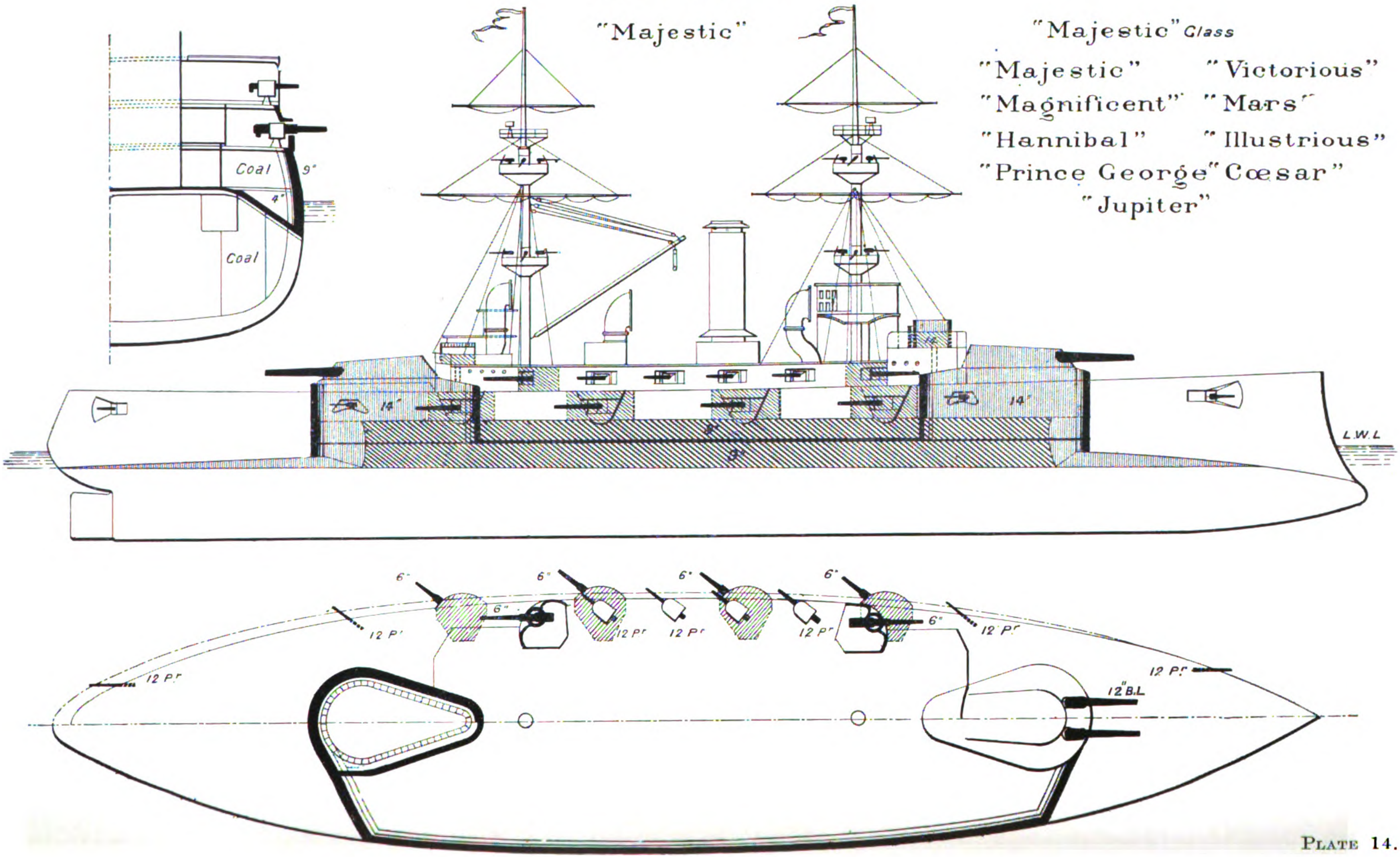


PLATE 13.

GREAT BRITAIN

"Majestic"



"Majestic" Class

"Majestic" "Victorious"
"Magnificent" "Mars"
"Hannibal" "Illustrious"
"Prince George" "Cœsar"
"Jupiter"

PLATE 14.

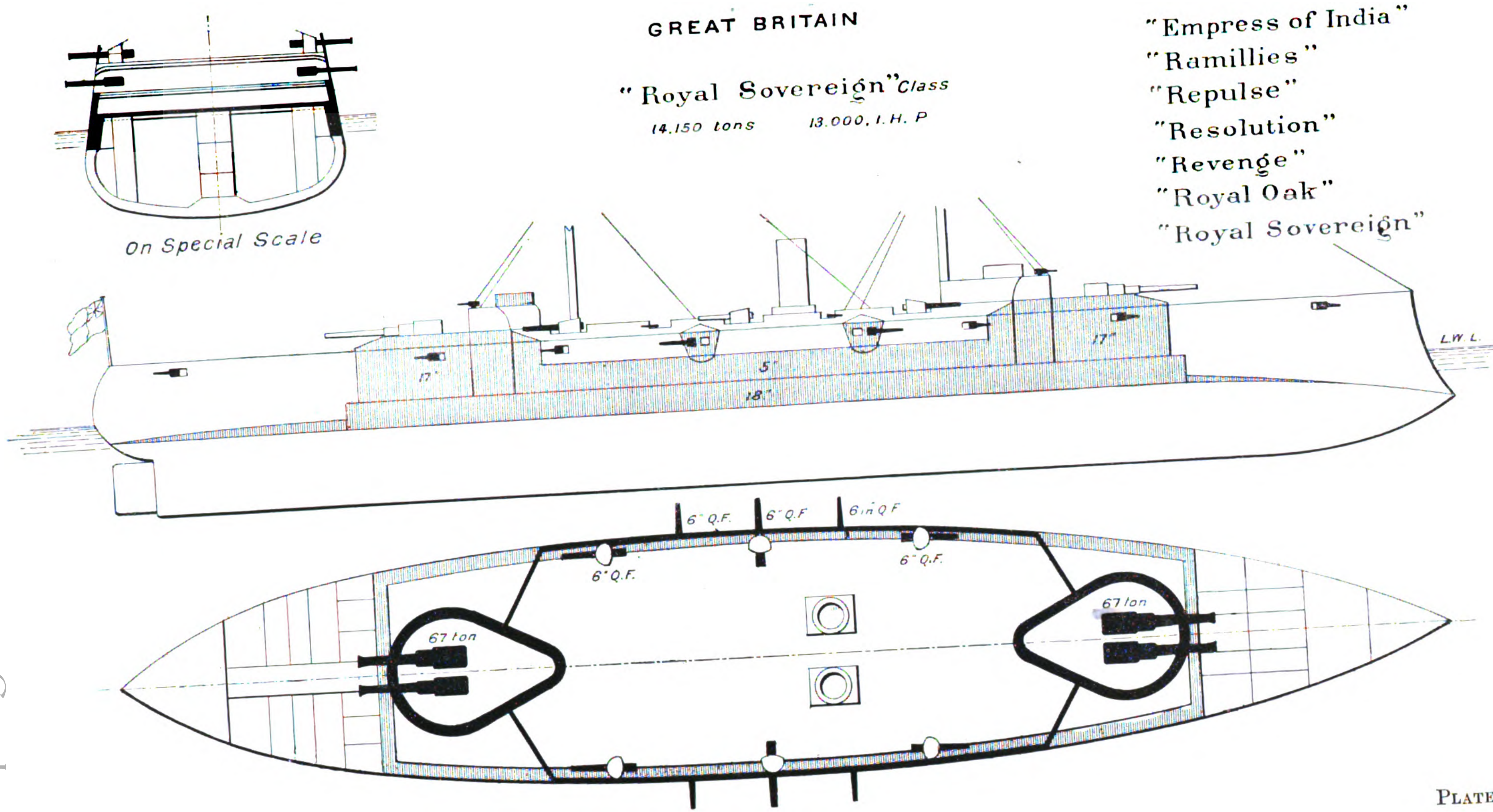

GREAT BRITAIN
"Royal Sovereign" Class
14.150 tons
13.000, I.H.P
"Empress of India"
"Ramillies"
"Repulse"
"Resolution"
"Revenge"
"Royal Oak"
"Royal Sovereign"
On Special Scale
L.W.L.
17"
5"
18"
17"
6" Q.F.
6" Q.F
6 in Q F
6" Q.F.
6" Q.F.
67 ton
67 ton

PLATE 15.

GREAT BRITAIN

"Hood"

TURRET SHIP WITH REDOUBTS

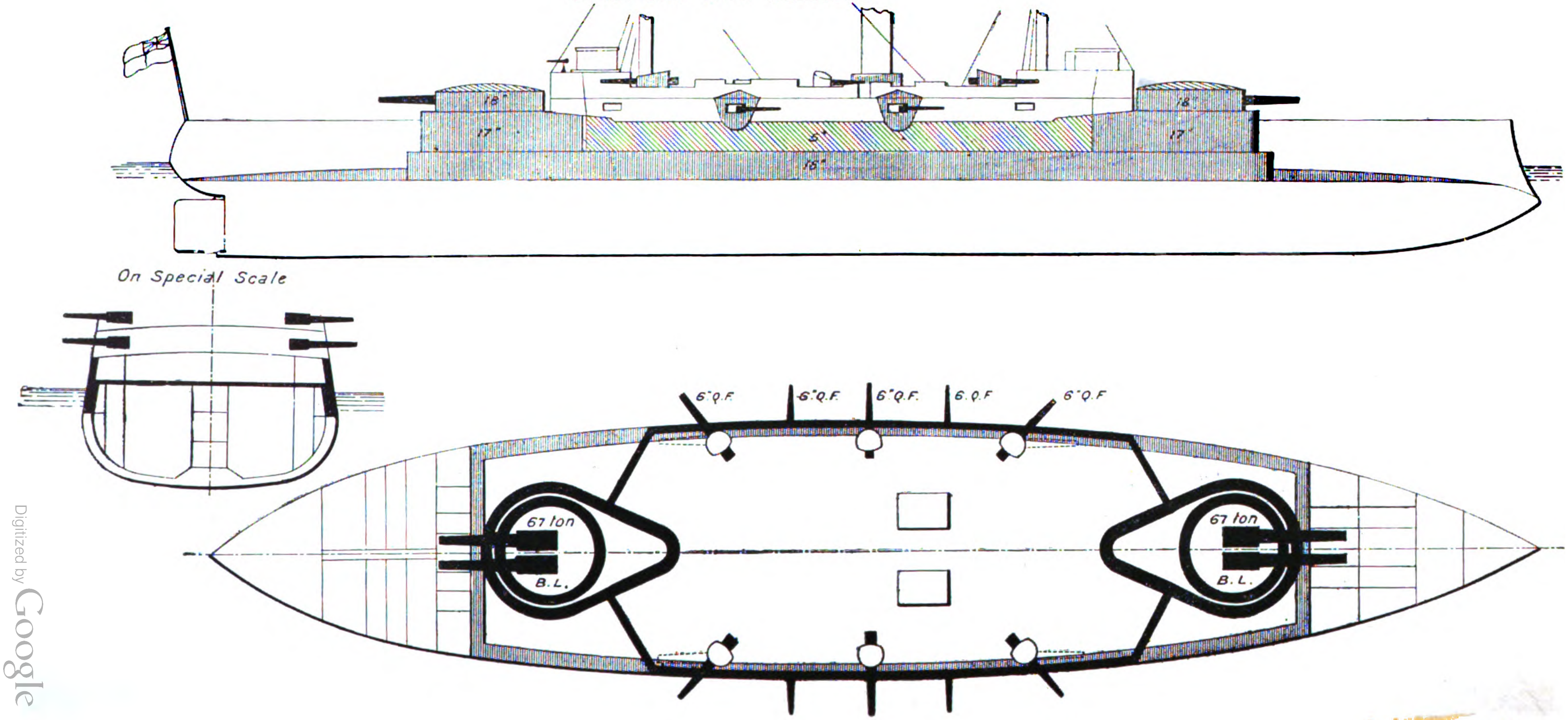
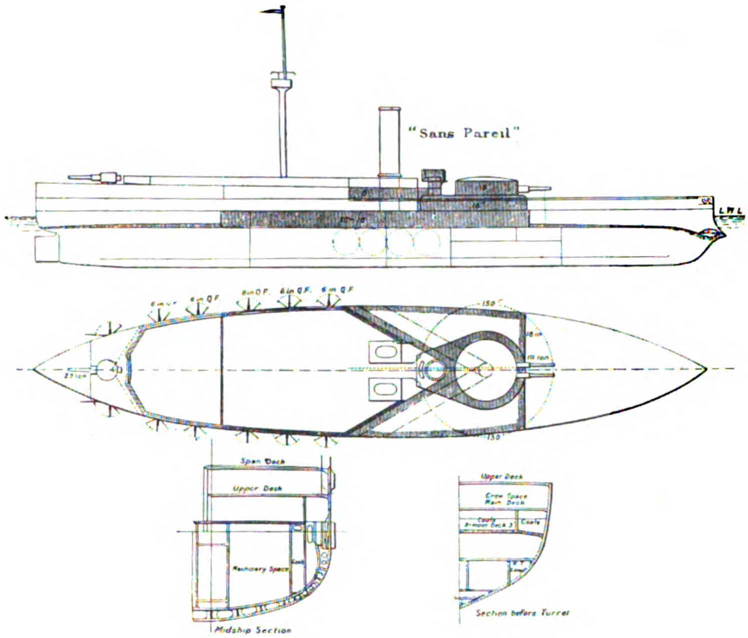
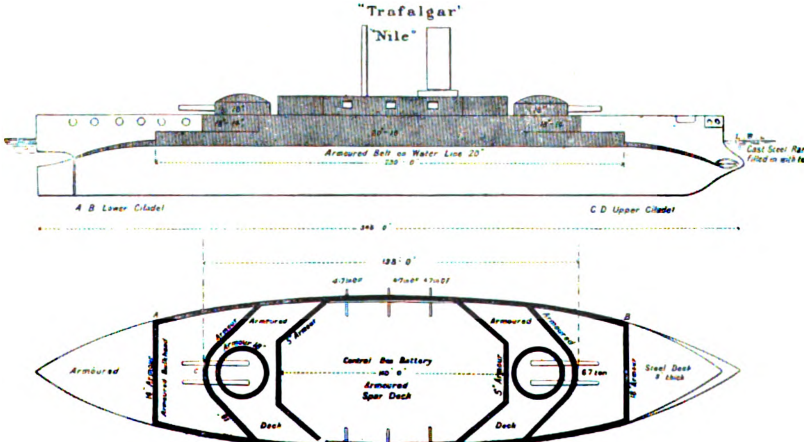


PLATE 16.

GREAT BRITAIN.



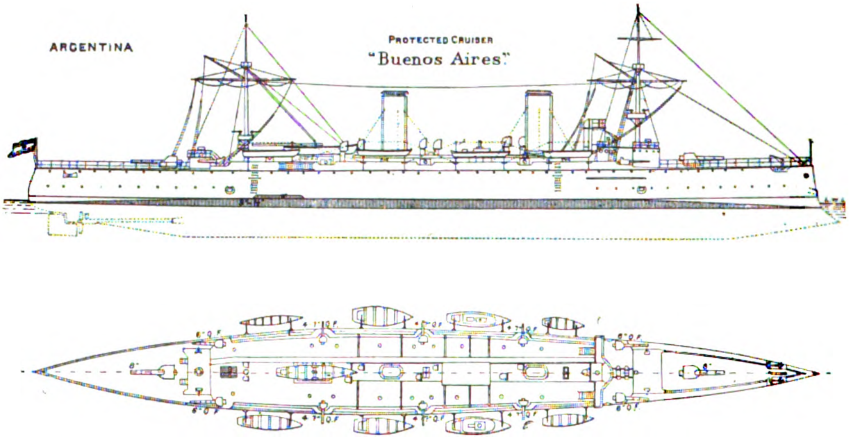


C

ARGENTINA

PROTECTED CRUISER

"Buenos Aires."



ARGENTINA.

"Nueve de Julio."

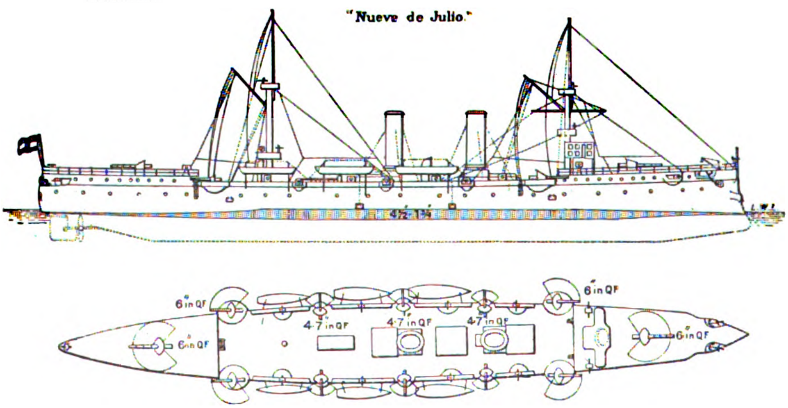
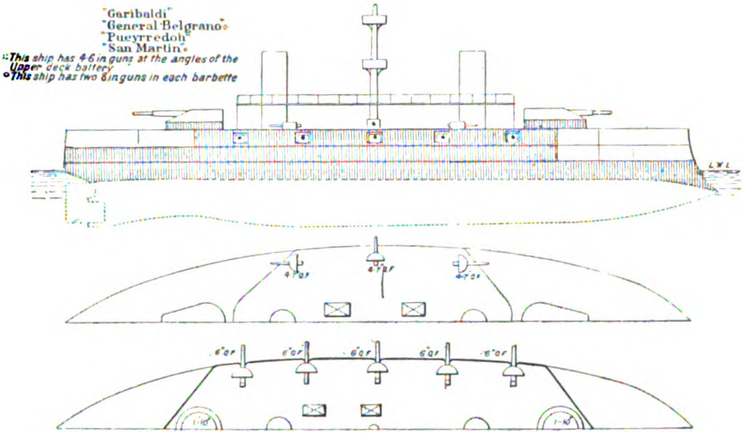
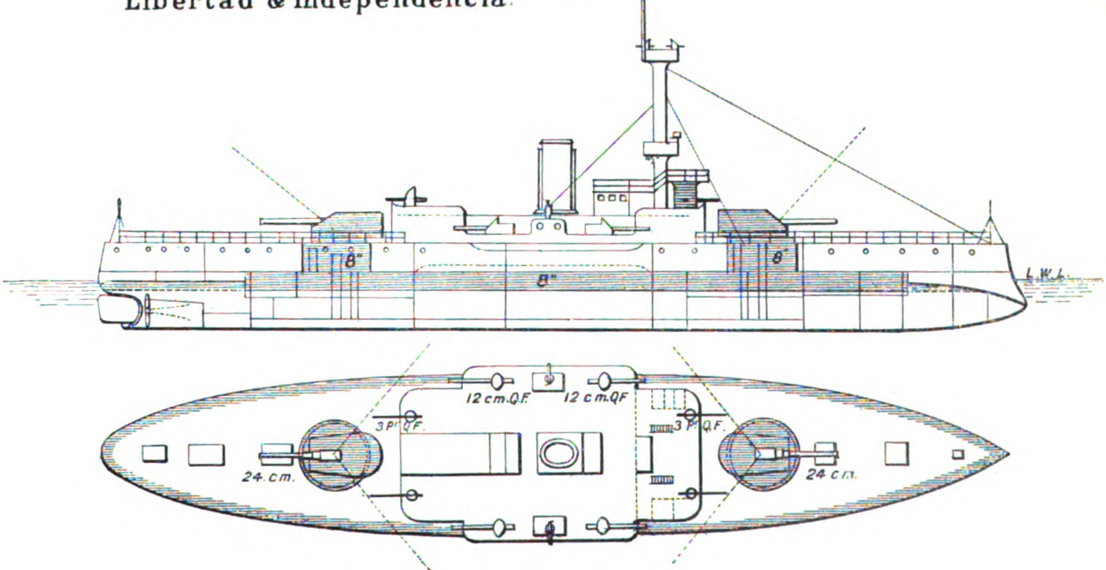


PLATE 18.

ARGENTINA.



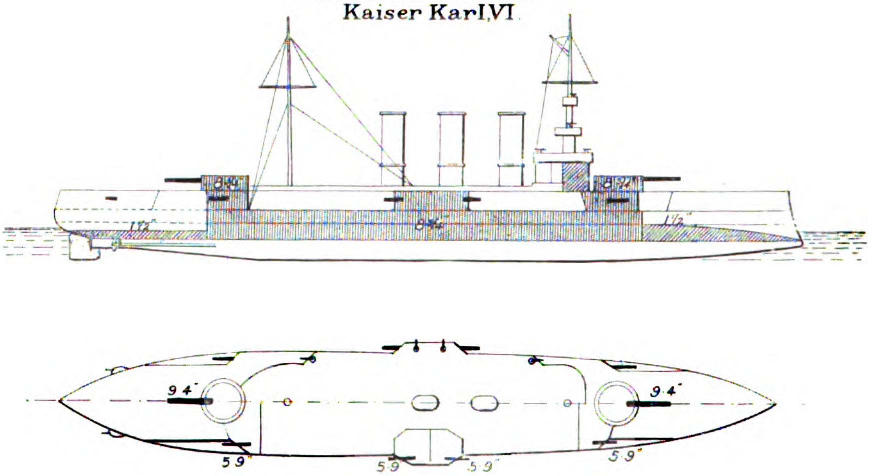
"Libertad" & "Independencia".



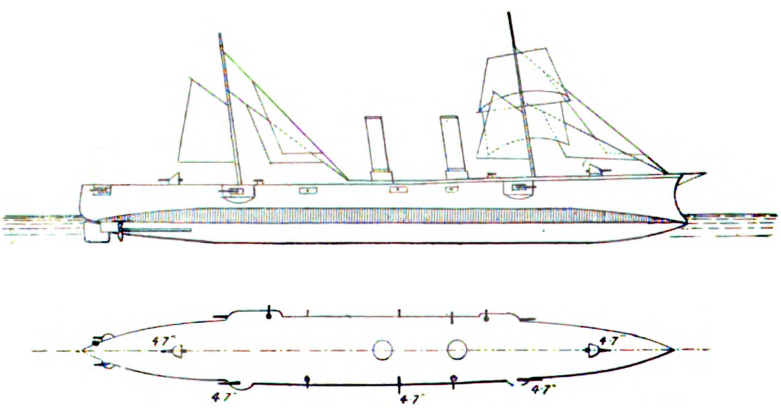
AUSTRIA-HUNGARY.

ARMOURED CRUISER.

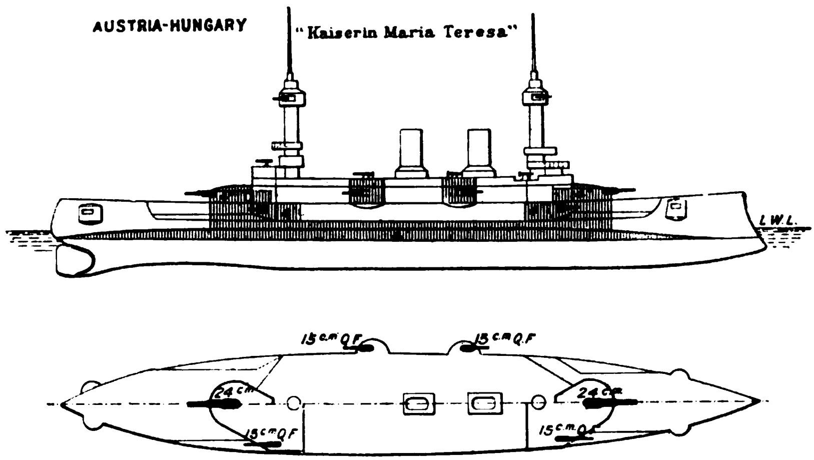
Kaiser Karl VI.



Zenta

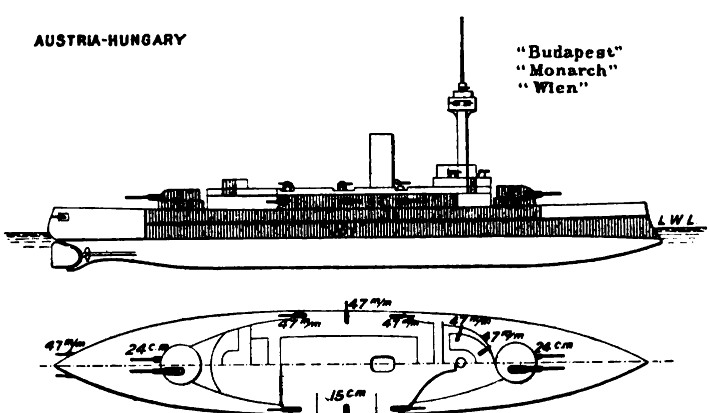


AUSTRIA-HUNGARY "Kaiserin Maria Teresa"

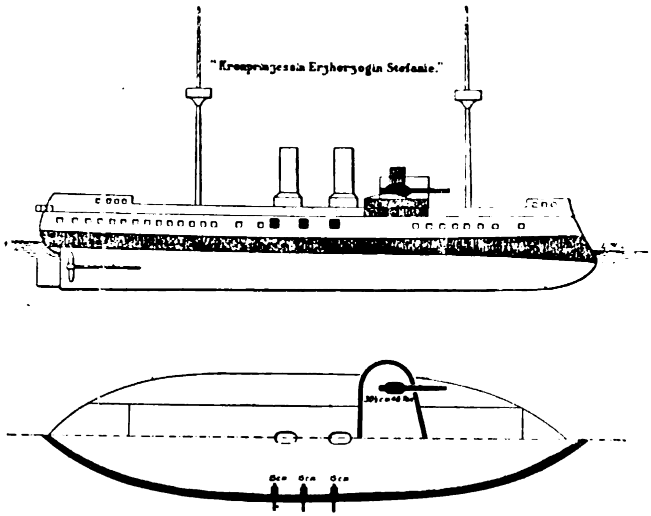


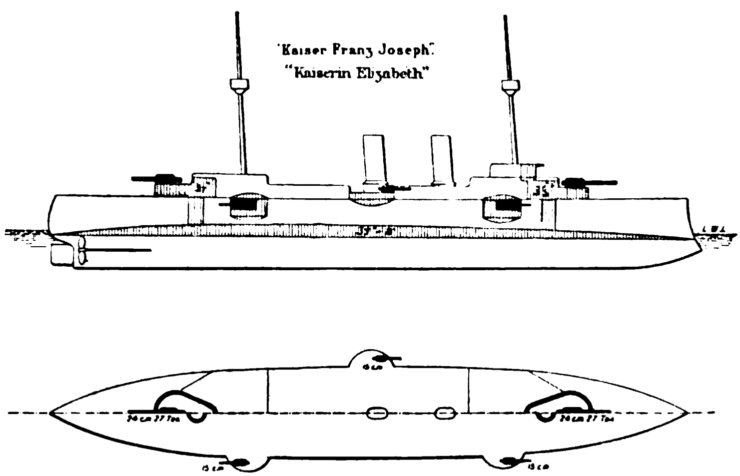
AUSTRIA-HUNGARY

"Budapest"
"Monarch"
"Wien"



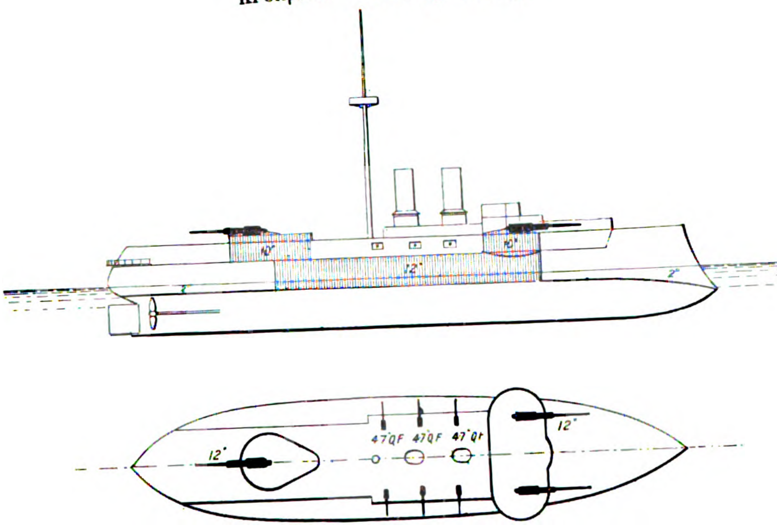
AUSTRIA-HUNGARY.





AUSTRIA-HUNGARY

Kronprinz Erzherzog Rudolph.



Habsburg.

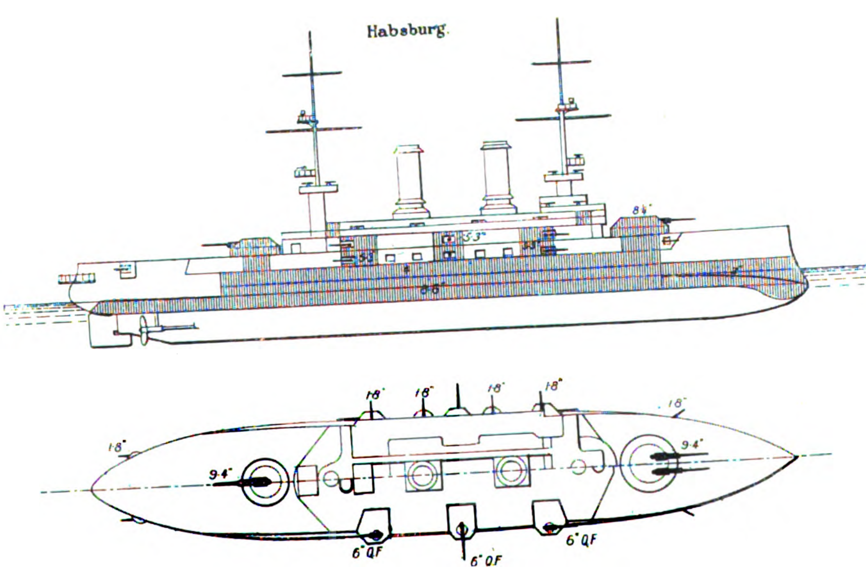
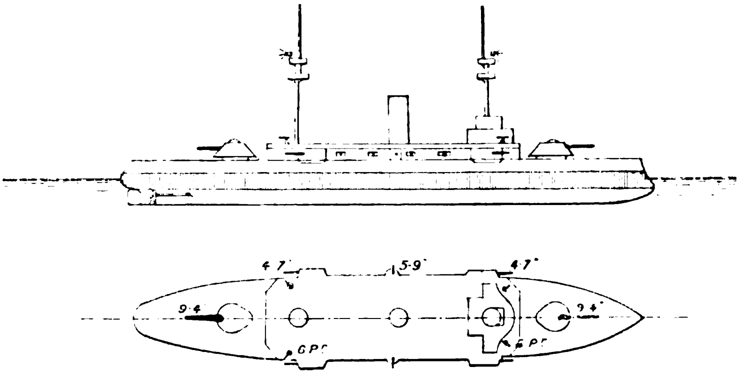


Plate 23.

BRAZIL.

Marshal Deodoro
Marshal Floriano.



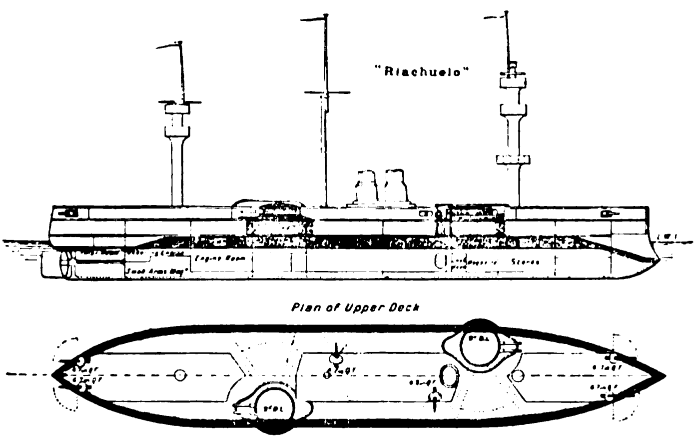
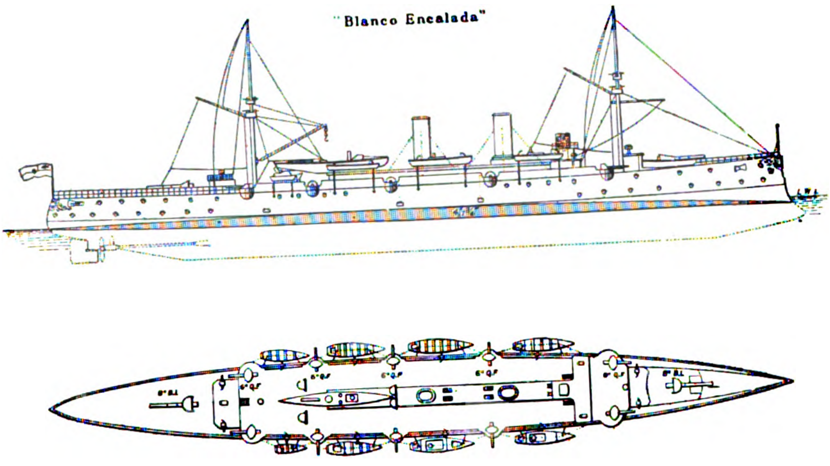


PLATE 24.

CHILI.

"Blanco Encalada"



"Capitan Prat"

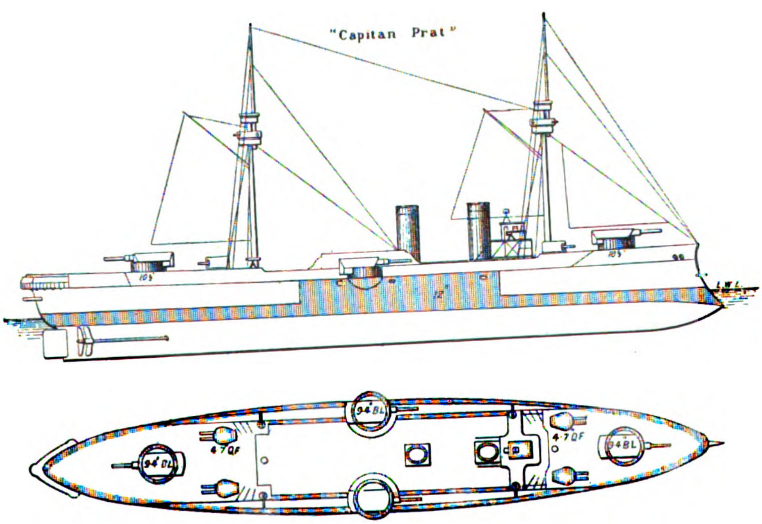
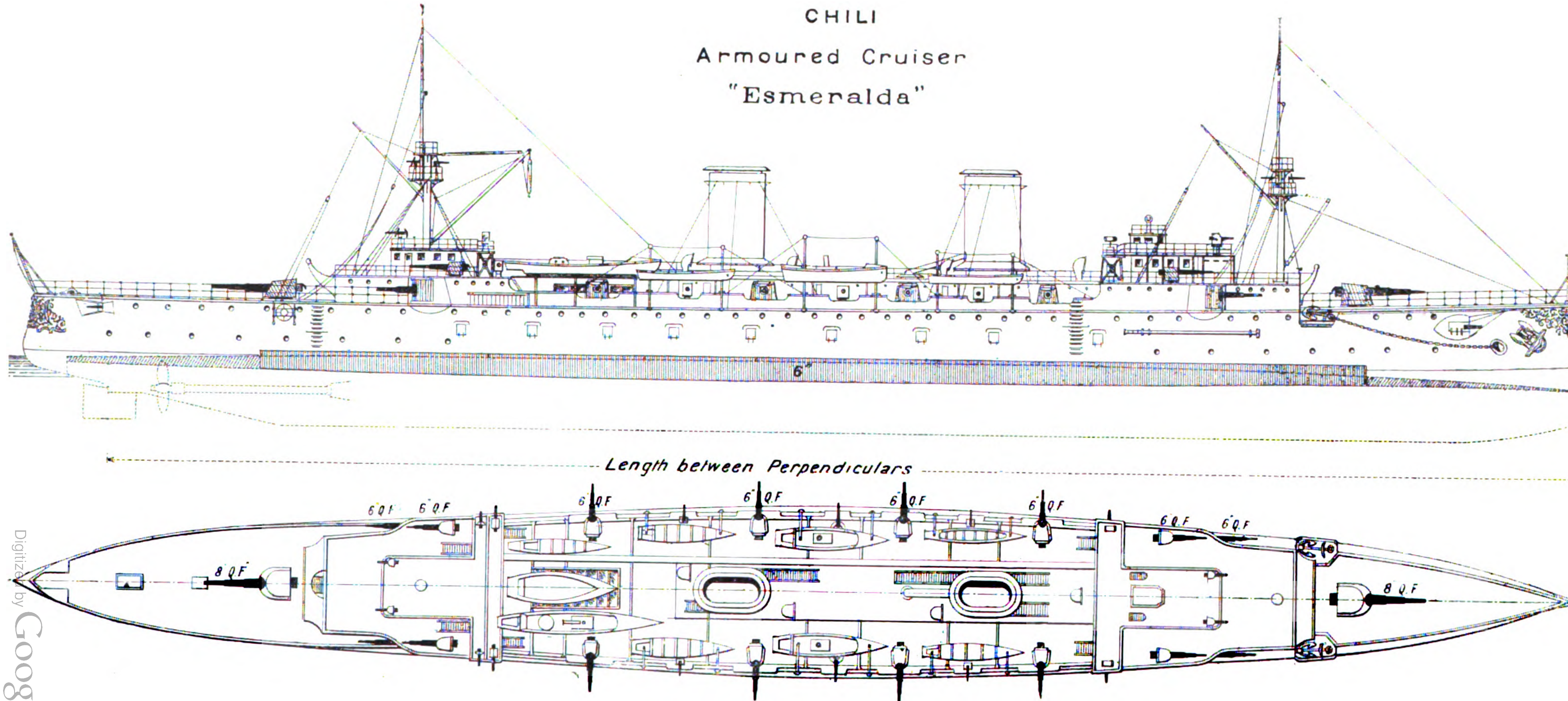


PLATE 25.

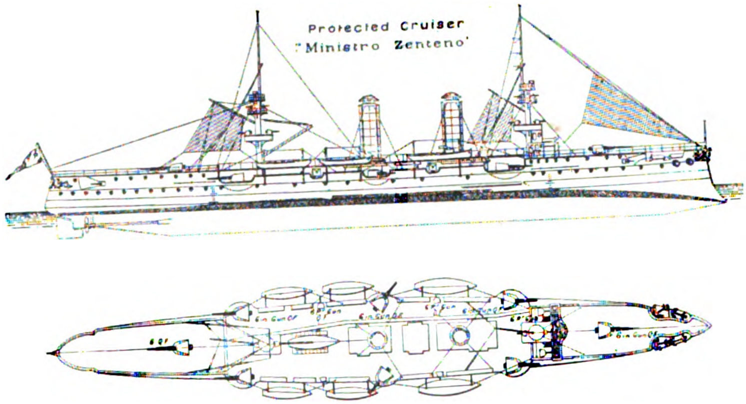
CHILI

Armoured Cruiser

"Esmeralda"



CHILI.



O' Higgins

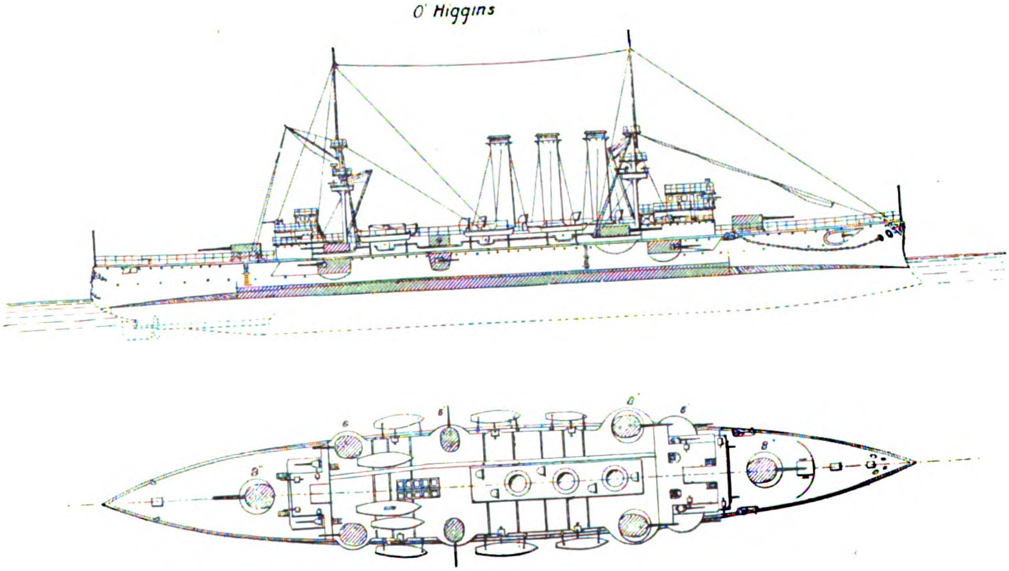
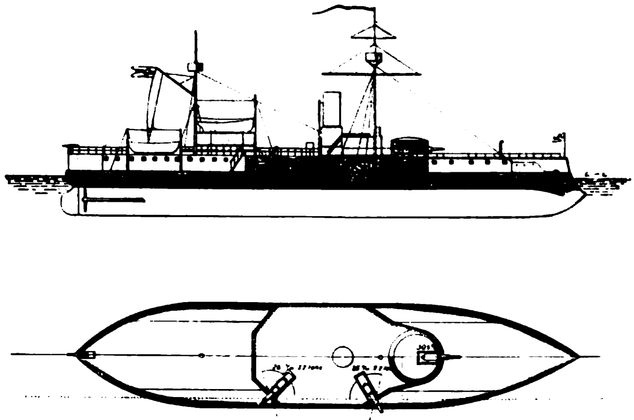


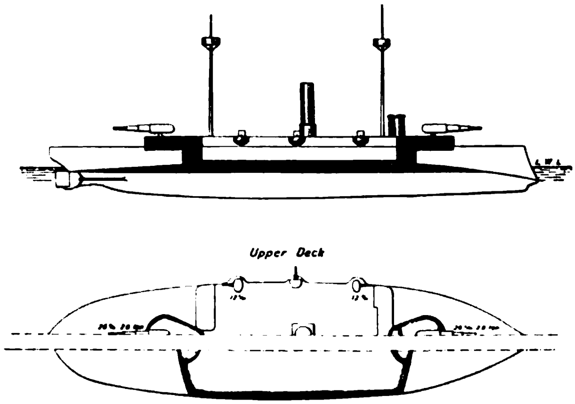
Plate 27.

DENMARK.

"Helgoland"

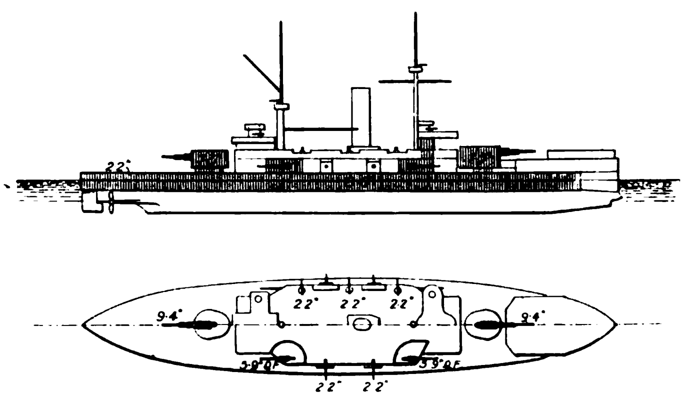


'Iver Hvitfeld'



DENMARK.

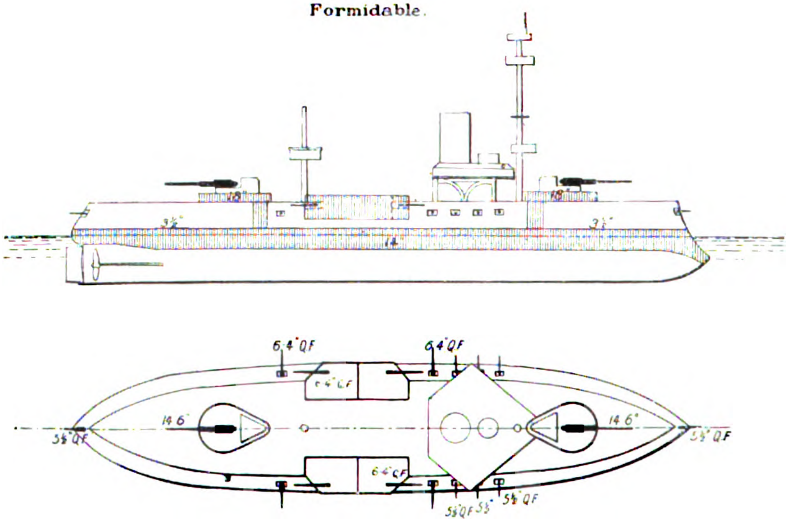
Herluf Trolle.



FRANCE.

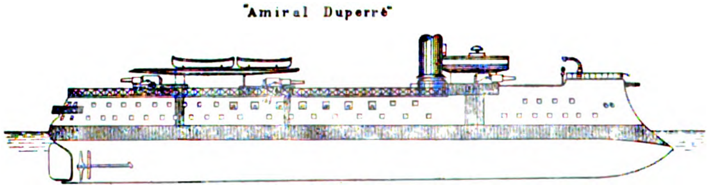
Amiral Baudin.

Formidable.

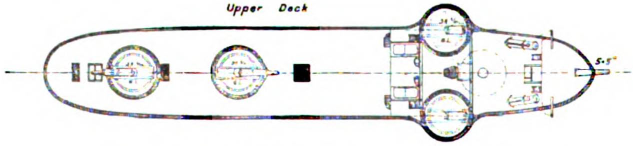


Note. "*Amiral Baudin*" has only four 6·4" guns

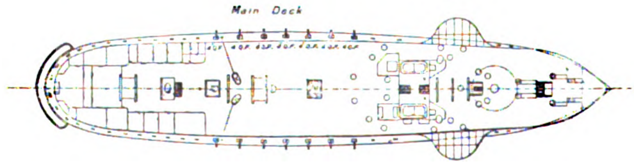
"Amiral Duperré"



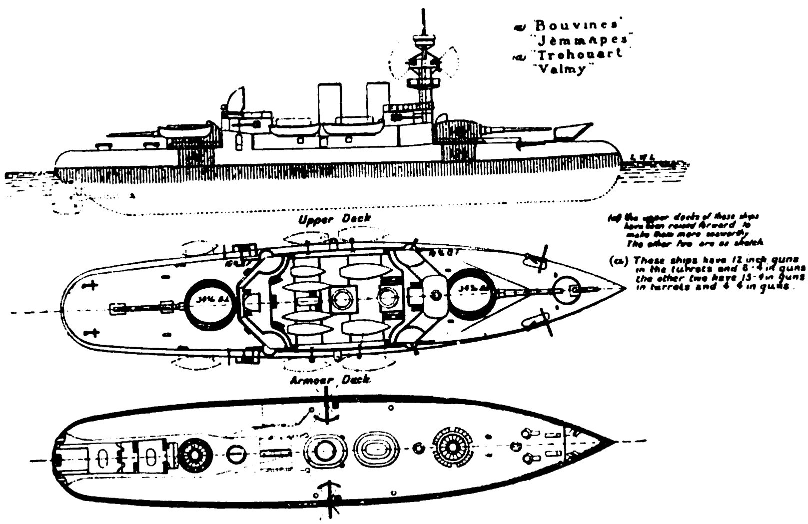
Upper Deck

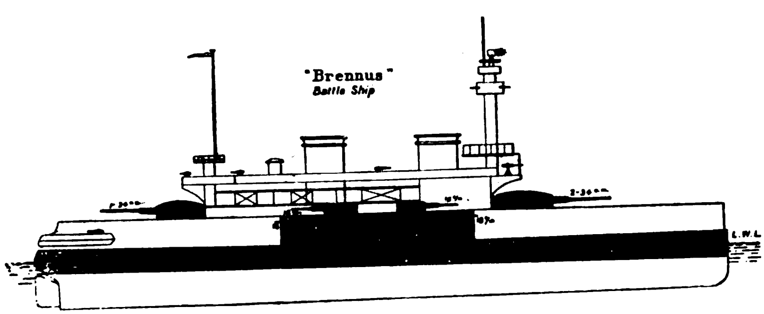


Main Deck



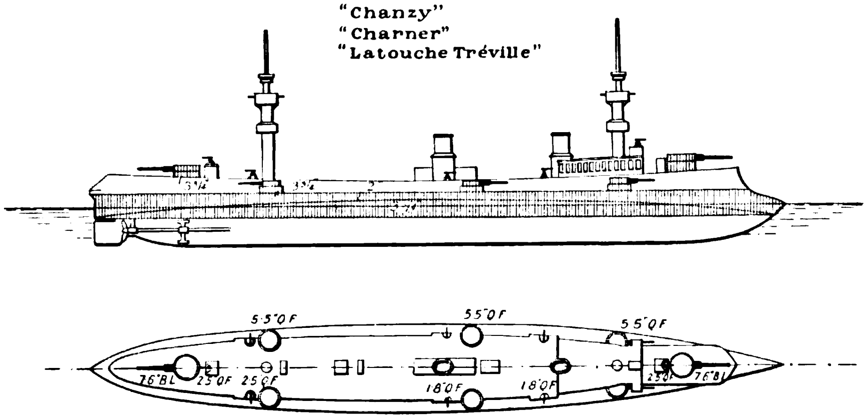
FRANCE.


(a) "Bouvines"
"Jèmmapes"
(a) "Trehouart"
"Valmy"
L.W.L.
Upper Deck
Armour Deck
(b) The upper decks of these ships have been raised forward to make them more seaworthy. The other two are as sketch.
(a) These ships have 12 inch guns in the turrets and 8-4 in guns the other two have 13-4 in guns in turrets and 4 4 in guns.

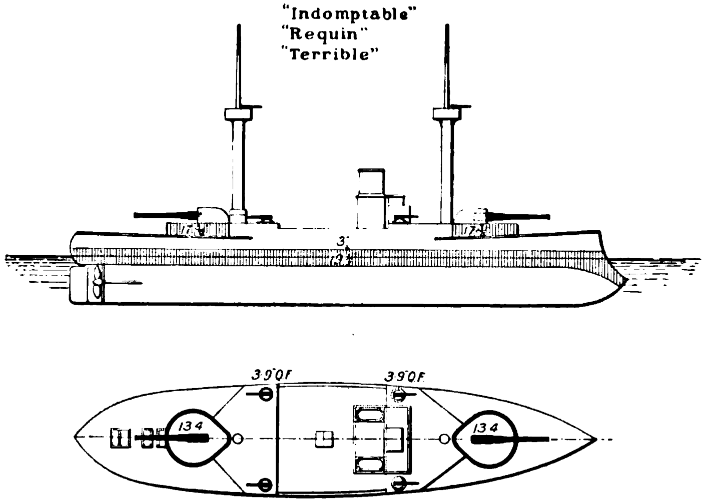

"Brennus"
Battle Ship
L.W.L.

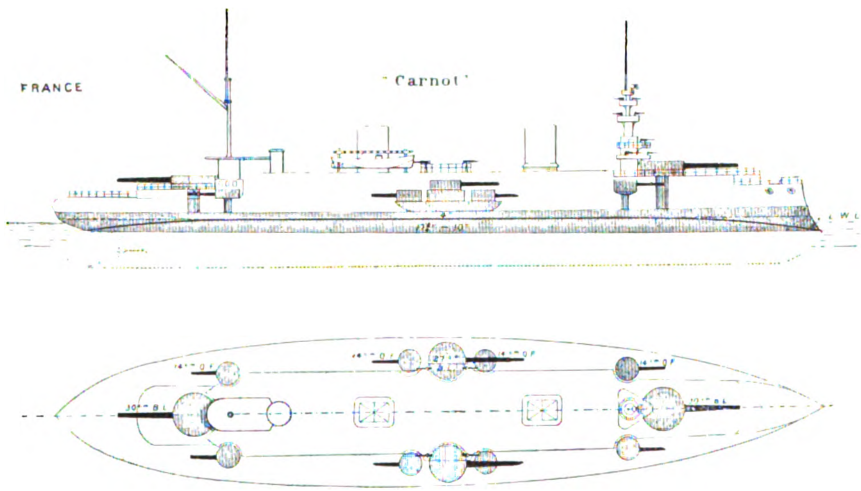
FRANCE.

"Bruix"
"Chanzy"
"Charner"
"Latouche Tréville"



"Caiman"
"Indomptable"
"Requin"
"Terrible"




FRANCE
"Carnot"

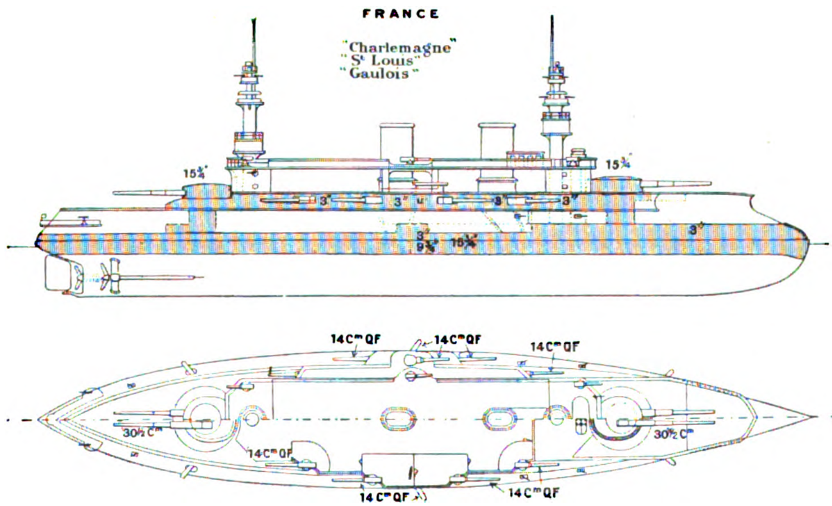
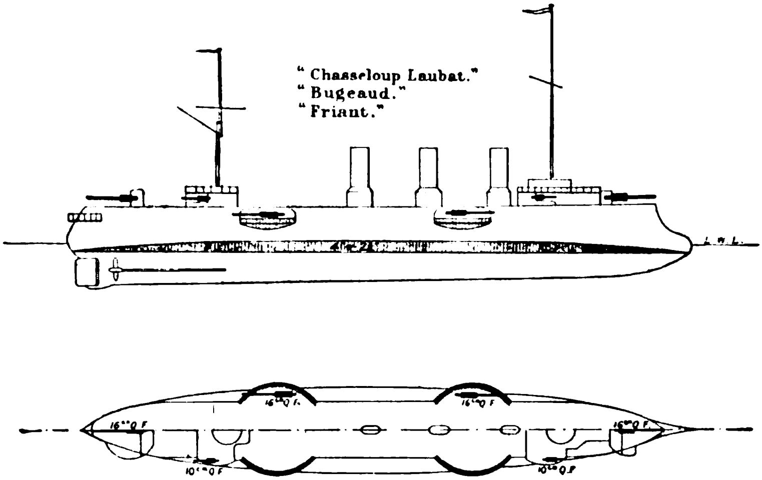

FRANCE
"Charlemagne"
"St Louis"
"Gaulois"
15¾"
15¾"
3"
3"
3"
3"
3"
9¾"
15¾"
14Cm QF
14Cm QF
14Cm QF
30½ Cm
30½ Cm
14Cm QF
14Cm QF
14Cm QF

PLATE 33.

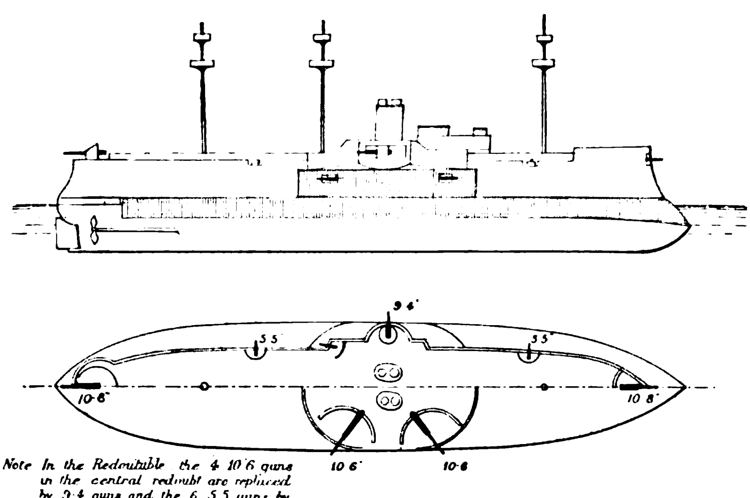
d

FRANCE.

"Chasseloup Laubat."
"Bugeaud."
"Friant."



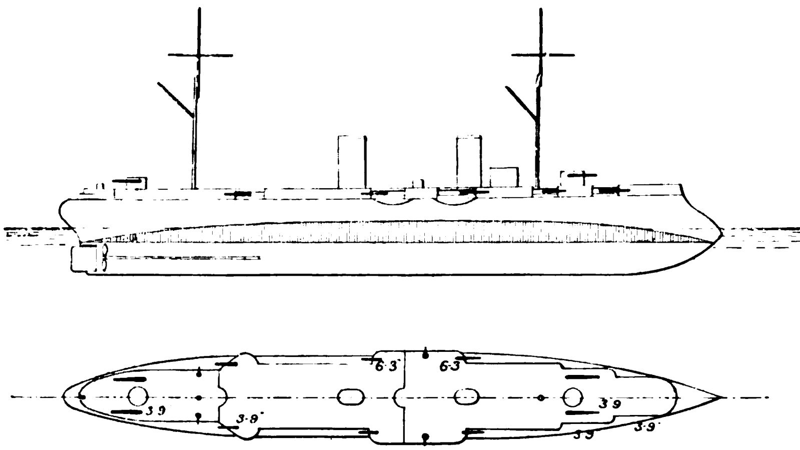
Devastation *Courbet.* *Redoutable*



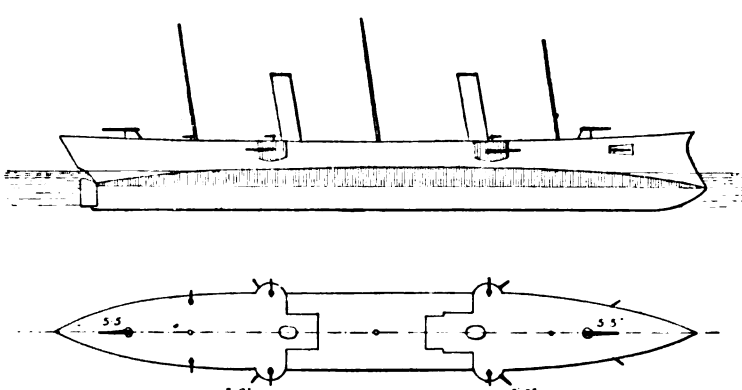
Note In the Redoutable the 4 10·6 guns in the central redoubt are replaced by 9·4 guns and the 6 5·5 guns by an equal number of 3·9 guns

FRANCE.

Descartes

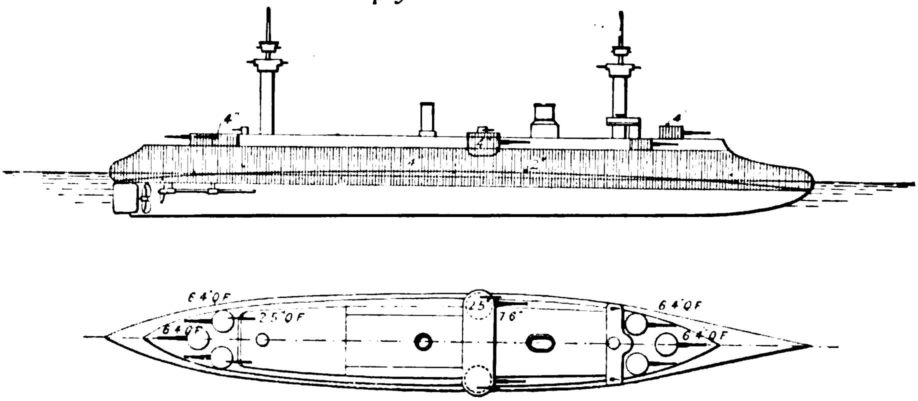


D'Estrées

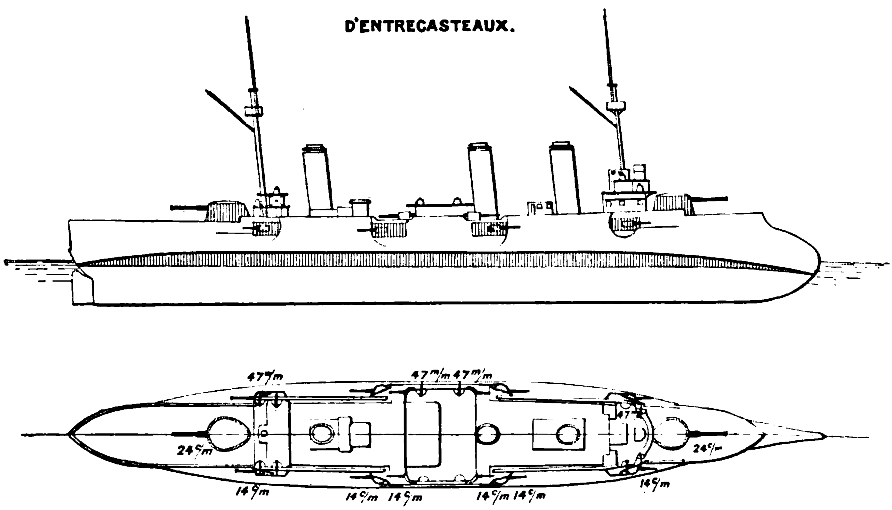


FRANCE.

"Dupuy de Lôme"

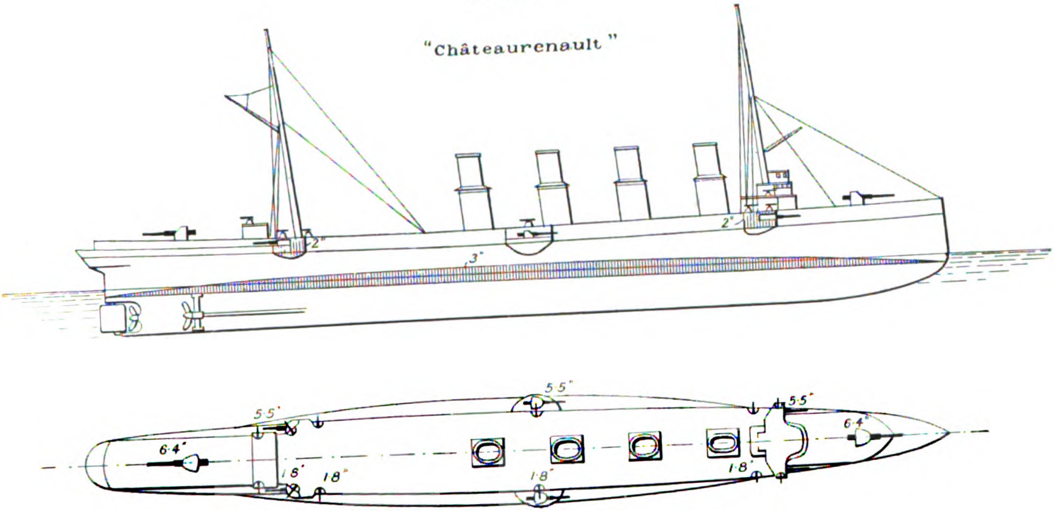


D'ENTRECASTEAUX.

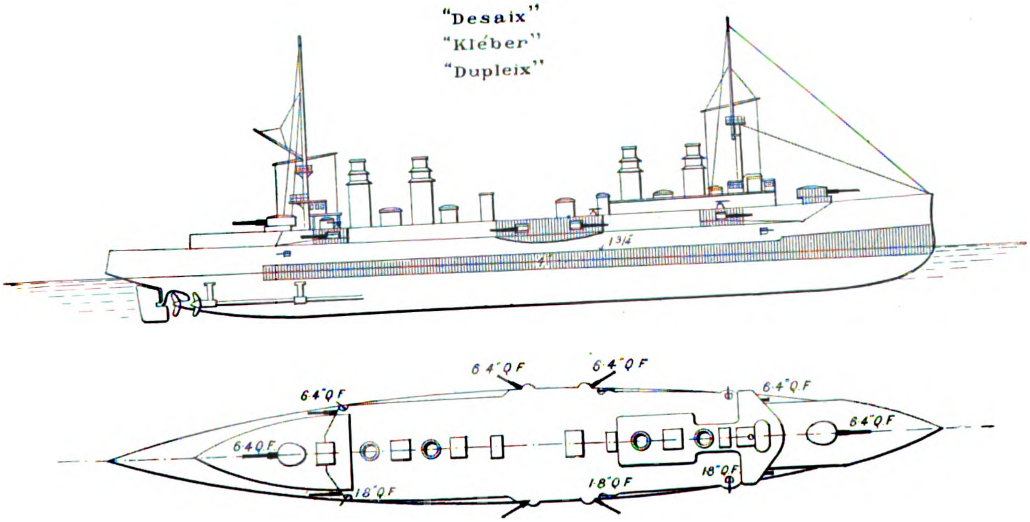


FRANCE.

"Châteaurenault"



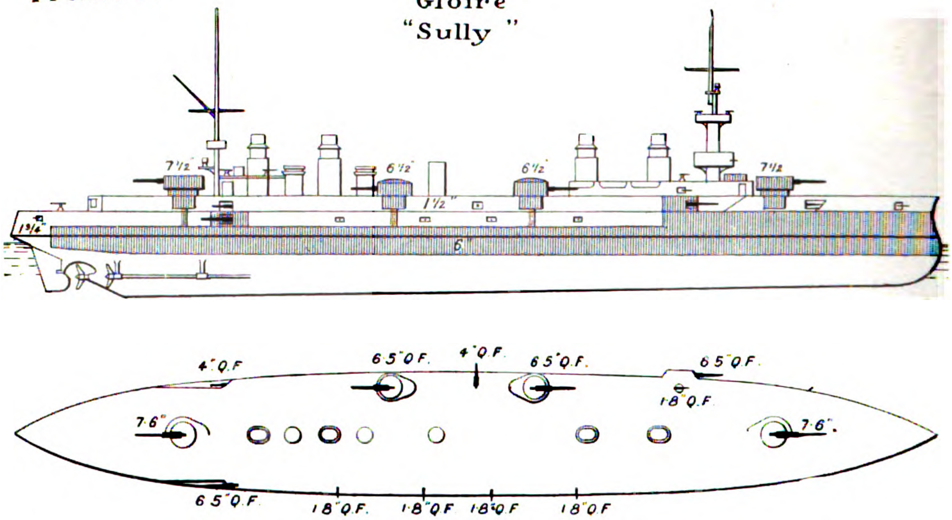
"Desaix"
"Kléber"
"Dupleix"



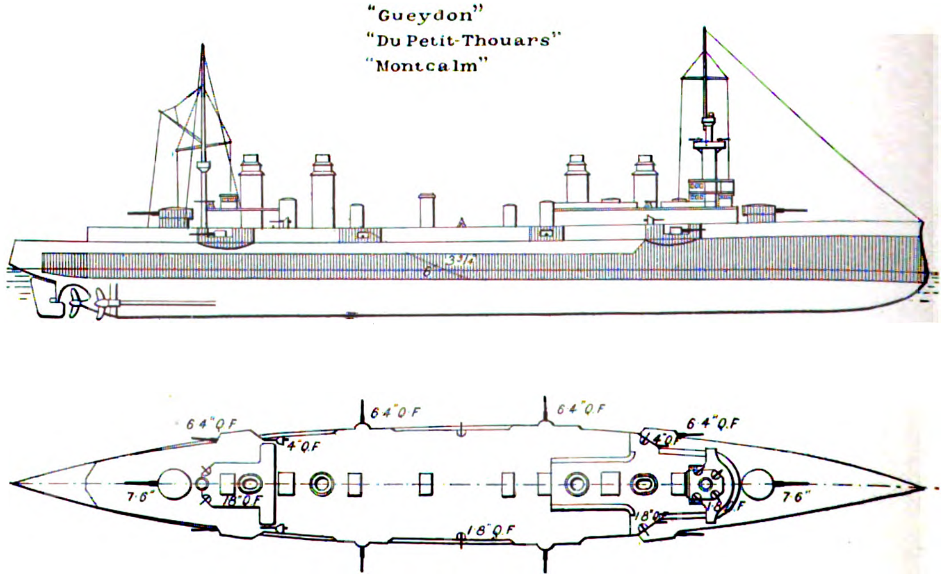
ARMOURED CRUISERS.

France.

"Condé"
"Gloire"
"Sully"



"Gueydon"
"Du Petit-Thouars"
"Montcalm"



FRANCE

BATTLE-SHIP SECOND CLASS

Henri IV.

On Special Scale
75 Feet to the Inch.

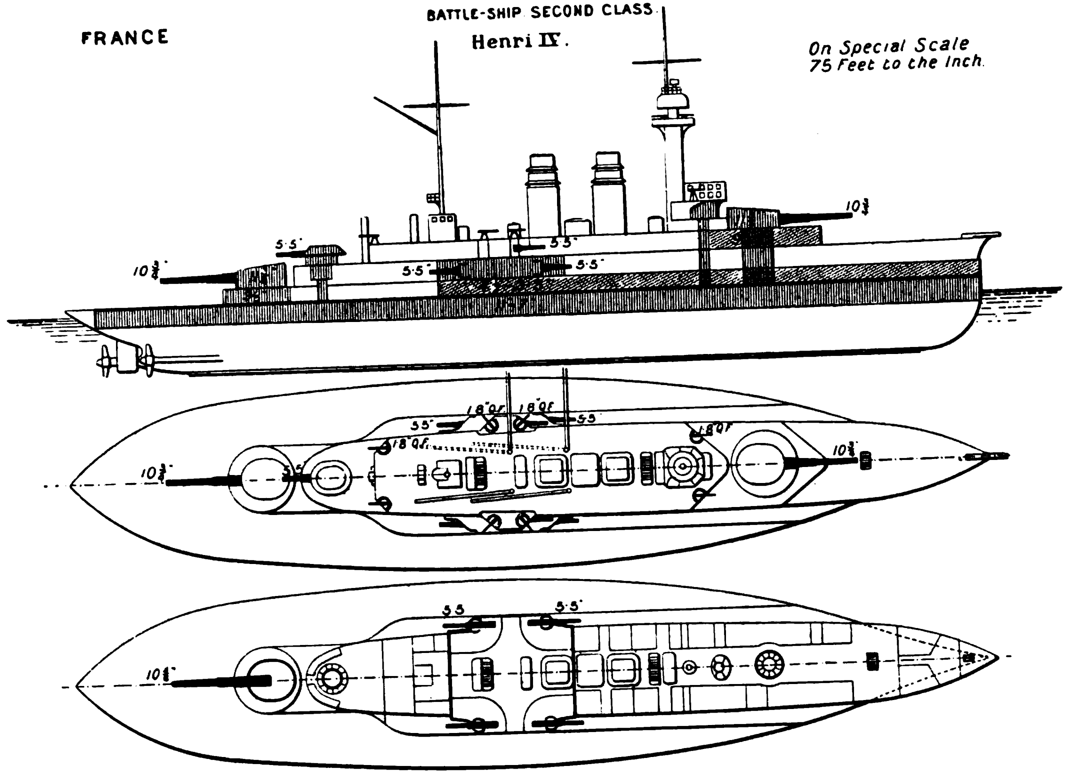
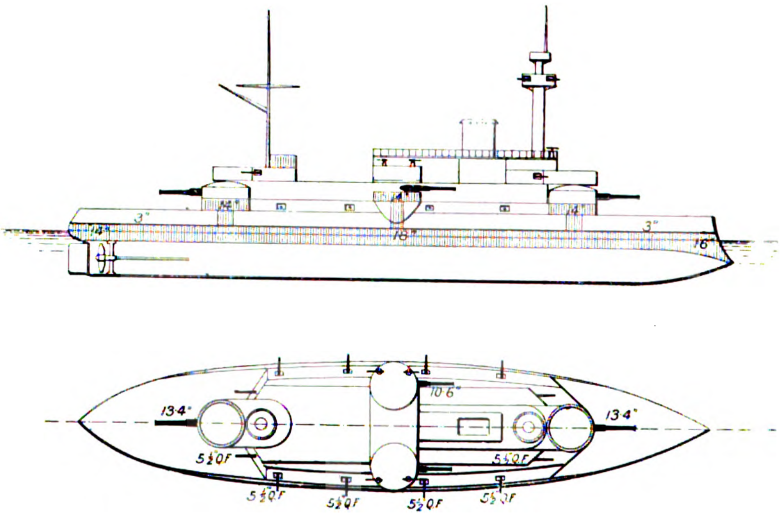


PLATE 39.

FRANCE.

Hoche



ARMOURED CRUISER.

France **"Jeanne d'Arc"**

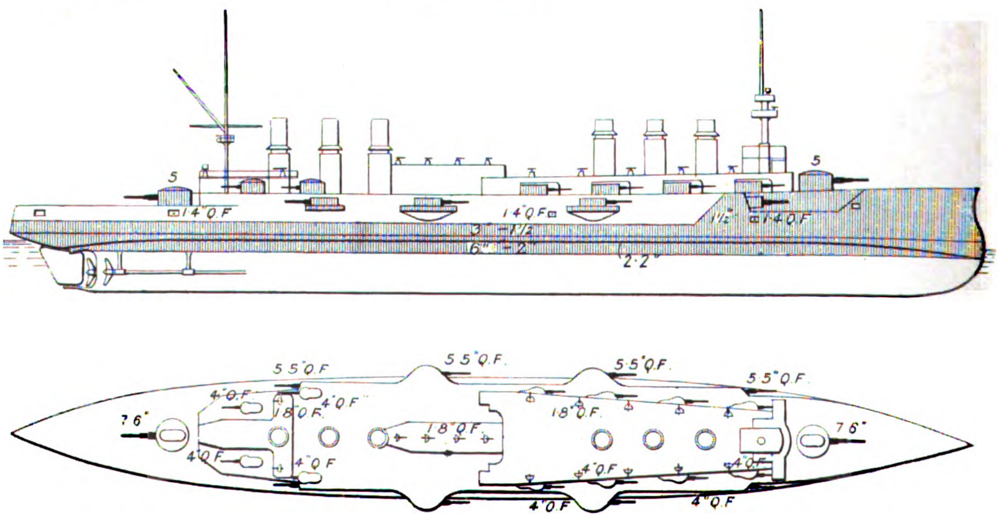


Plate 40.

FRENCH SHIPS.

"Jauréguiberry."

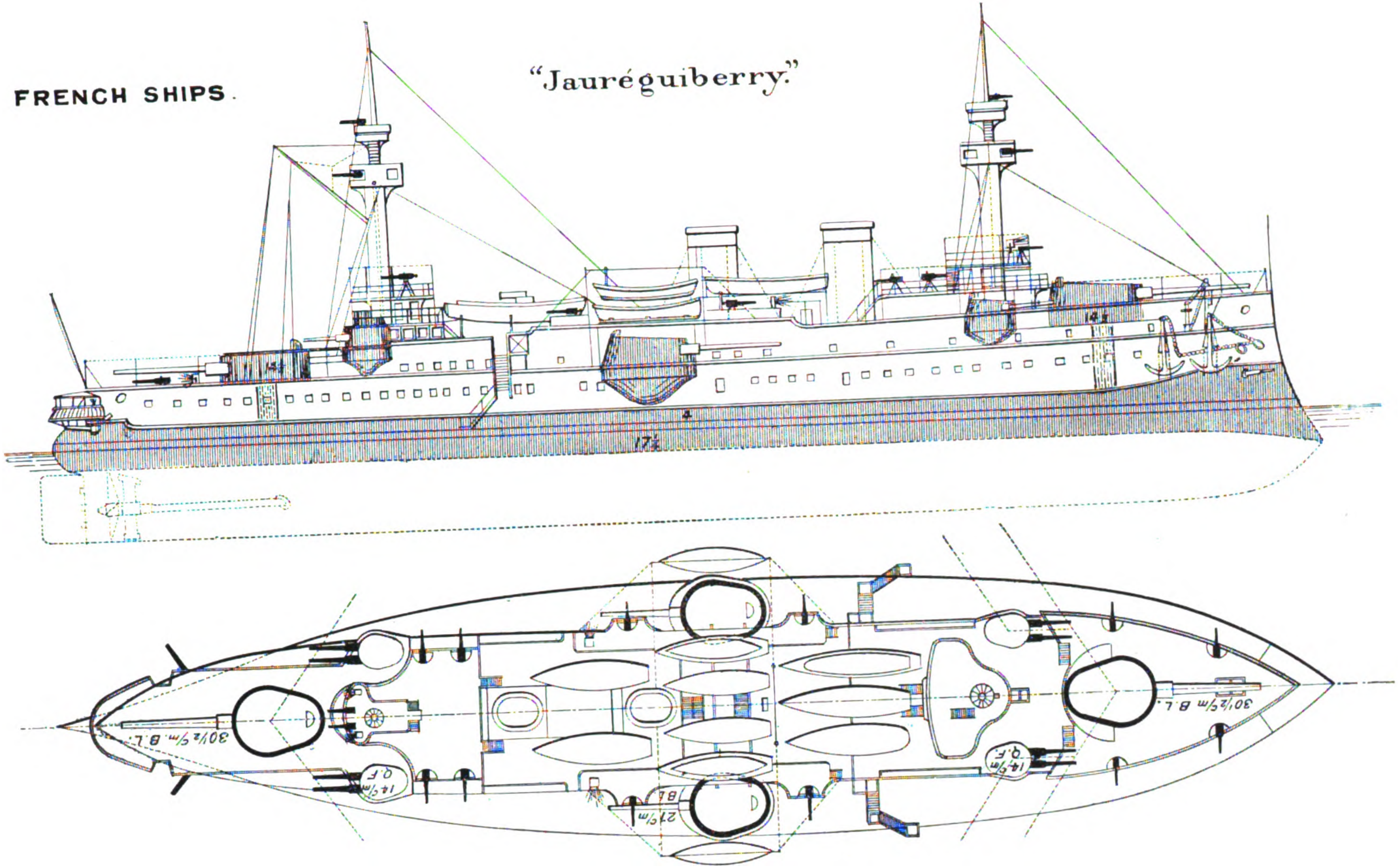
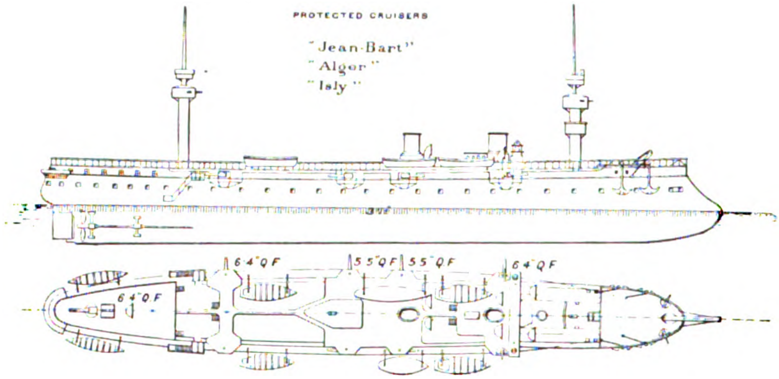


PLATE 41.

FRANCE.

PROTECTED CRUISERS

"Jean-Bart"
"Alger"
"Isly"



BATTLE-SHIPS.

"Magenta"
"Marçeau"
"Neptune"

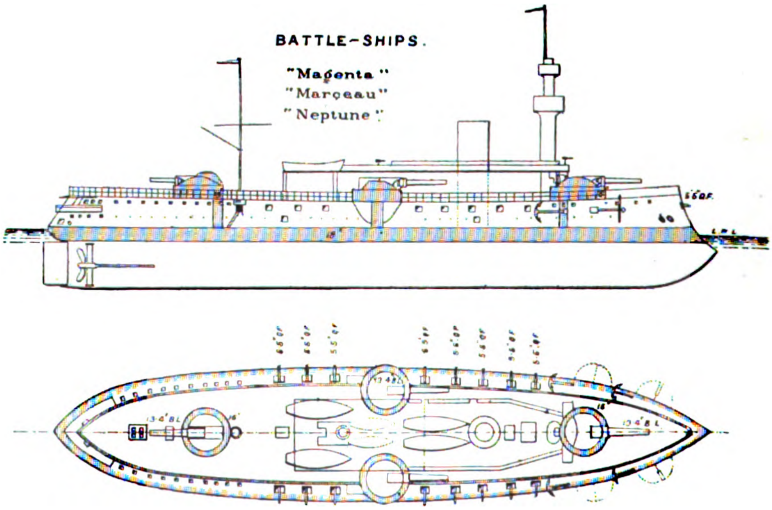
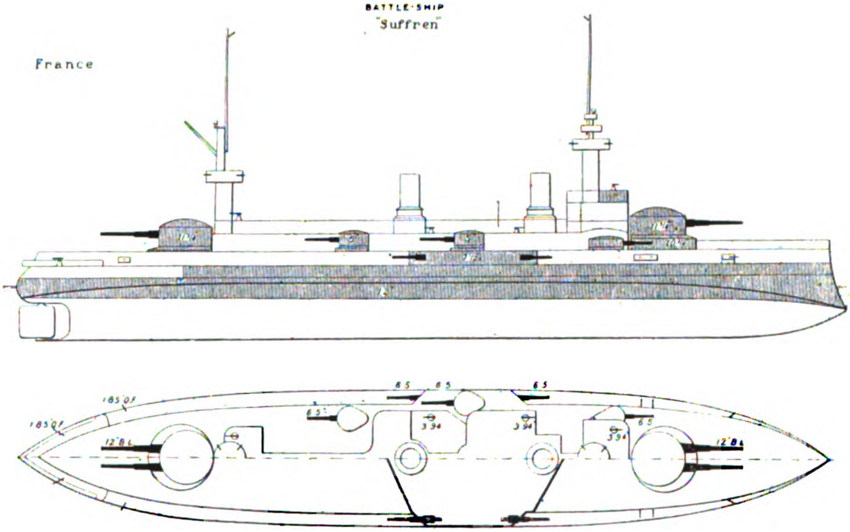


PLATE 42.

BATTLE-SHIP
"Suffren"

France



Pothüau

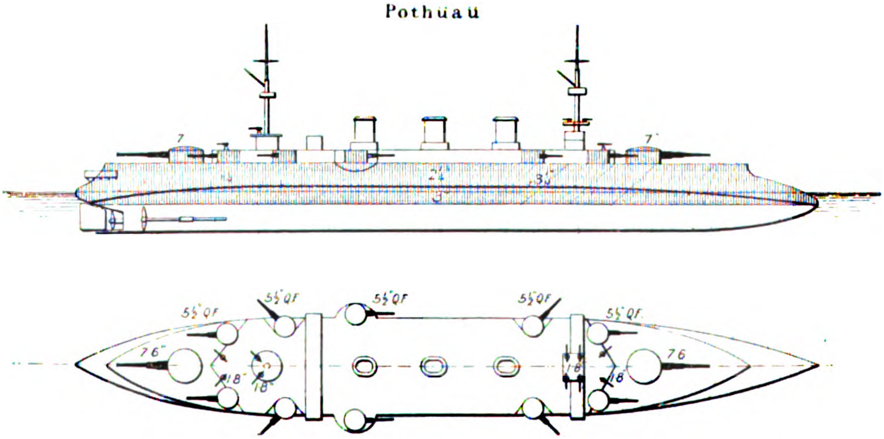
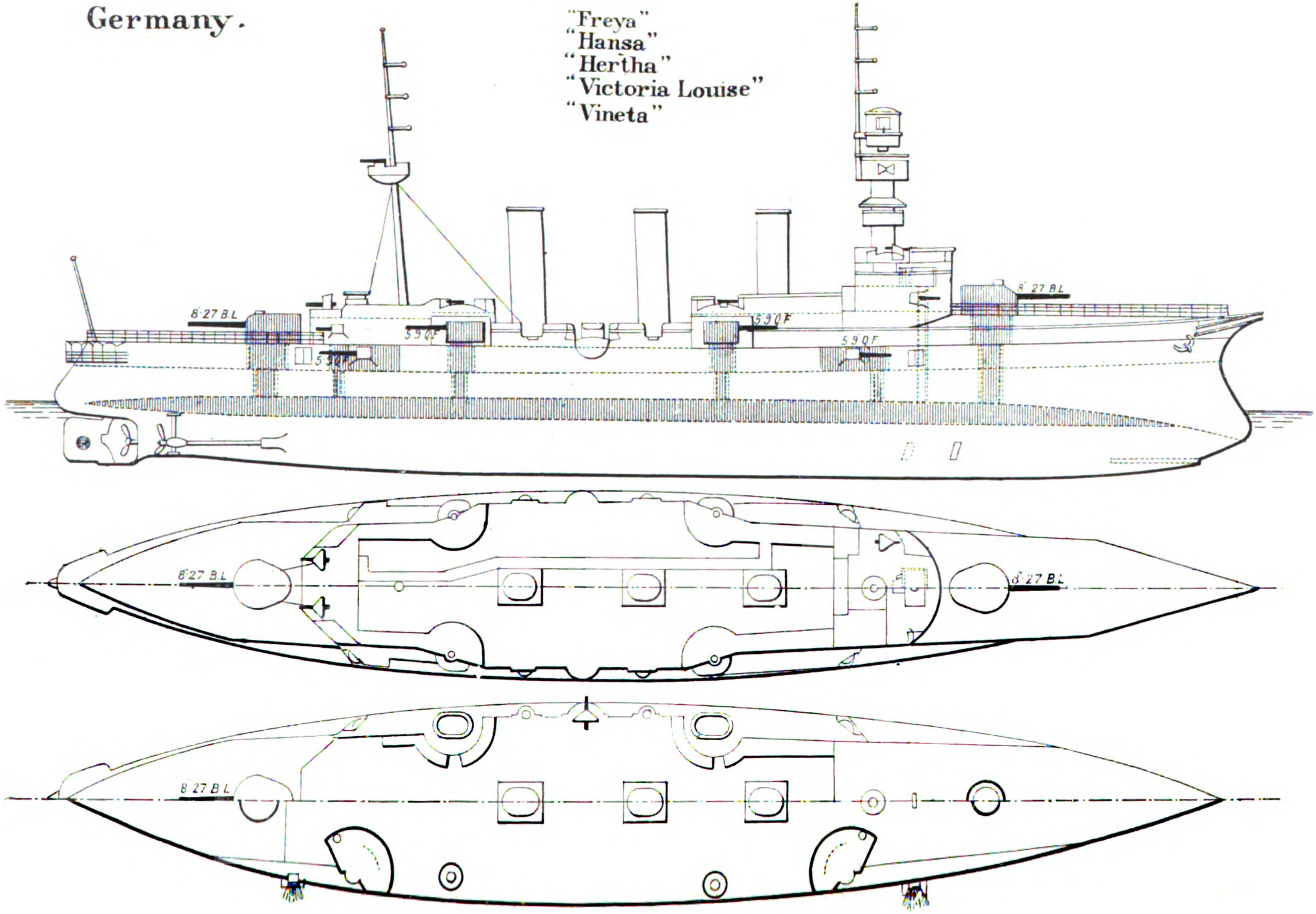


Plate 43.

Germany.

"Freya"
"Hansa"
"Hertha"
"Victoria Louise"
"Vineta"



Germany

"Fürst Bismarck"

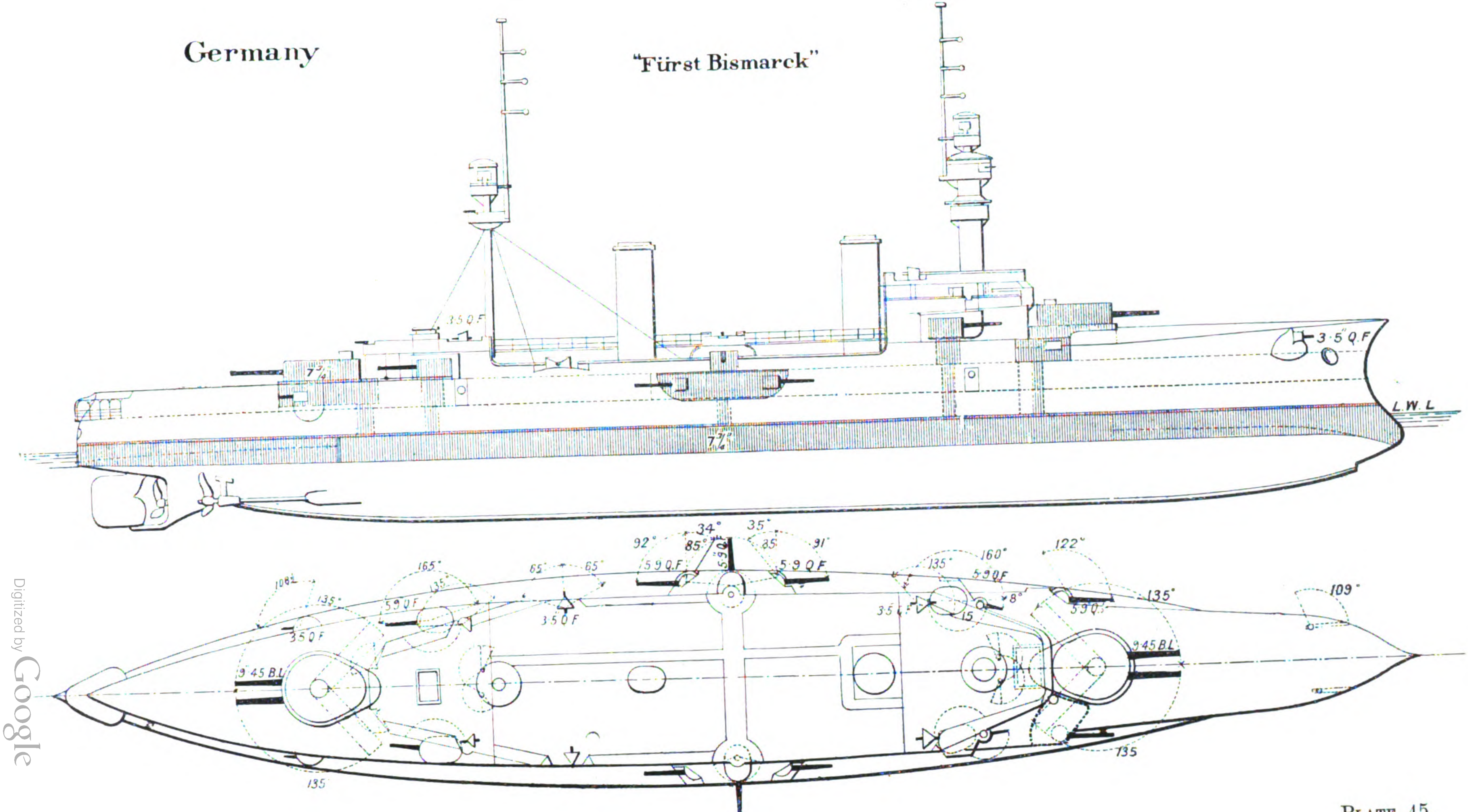
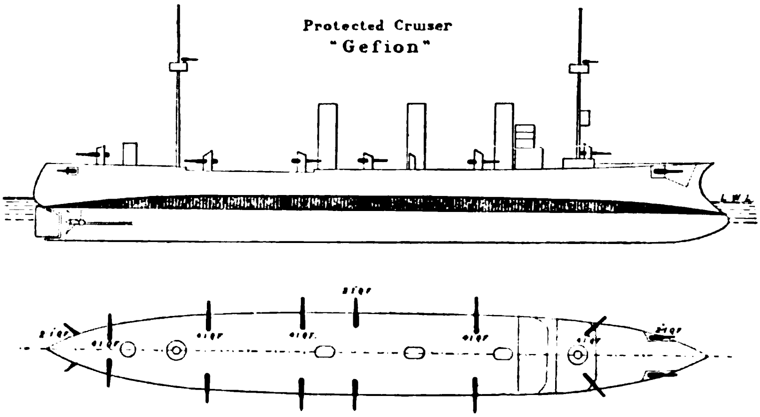


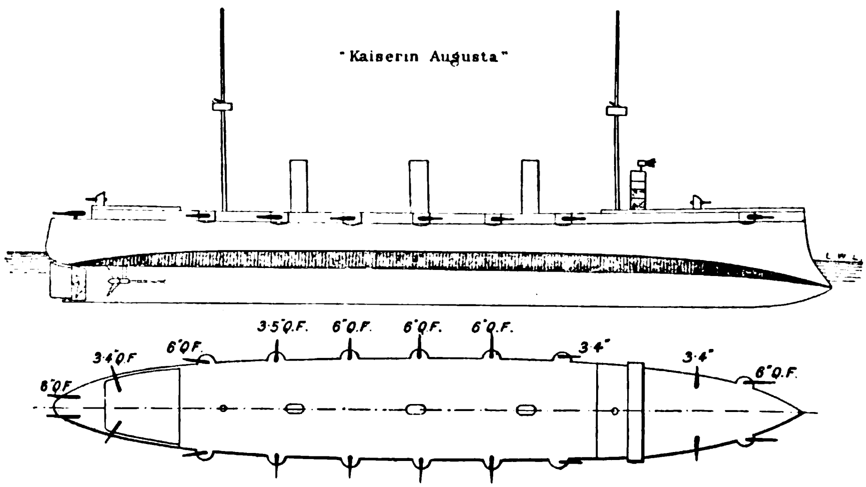
PLATE 45.

GERMANY.

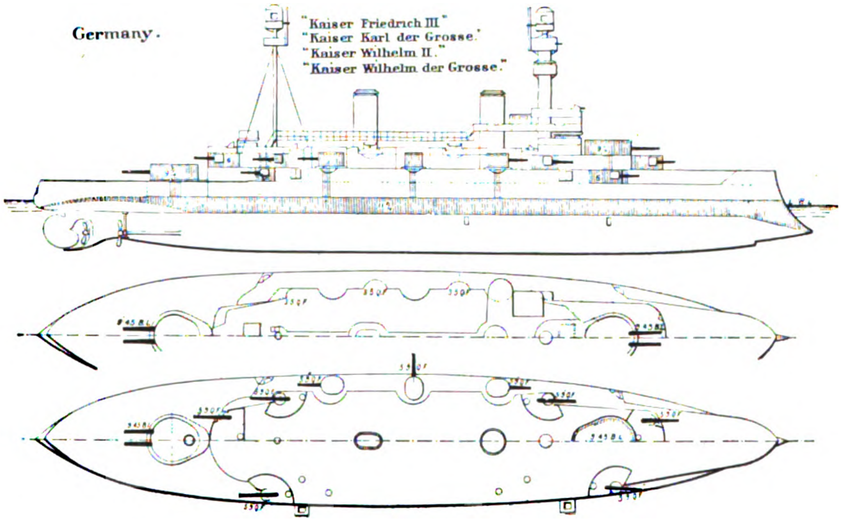
Protected Cruiser
"Gefion"



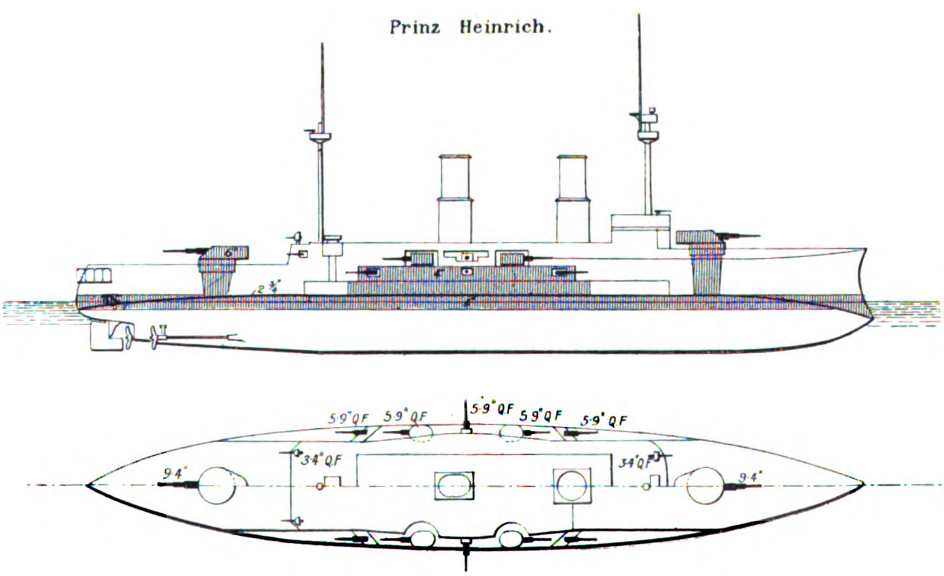
"Kaiserin Augusta"



Germany.

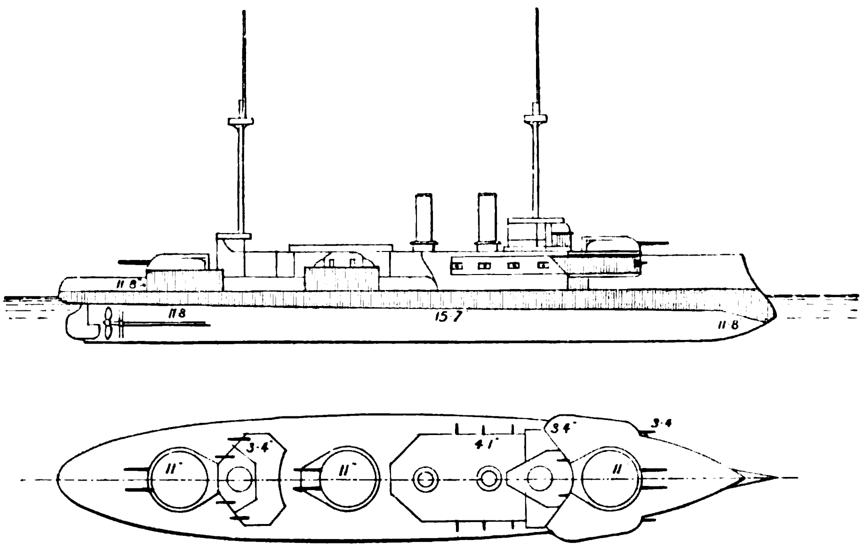


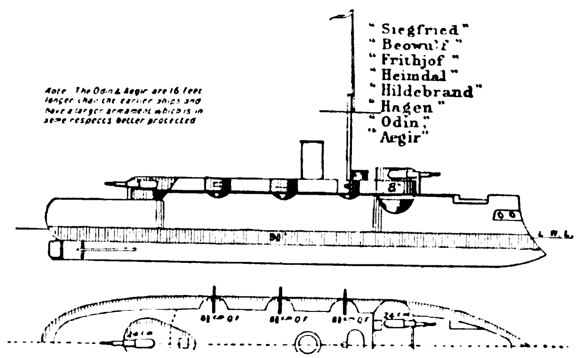
Prinz Heinrich.



GERMANY

Kürfurst Friedrich Wilhelm
Brandenburg.
Weissenburg.
Wörth

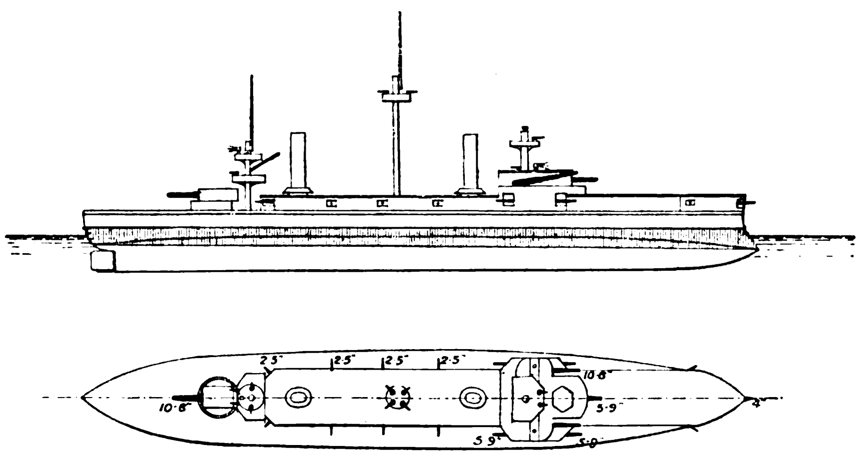




"Siegfried"
"Beowulf"
"Frithjof"
"Heimdal"
"Hildebrand"
"Hagen"
"Odin"
"Aegir"

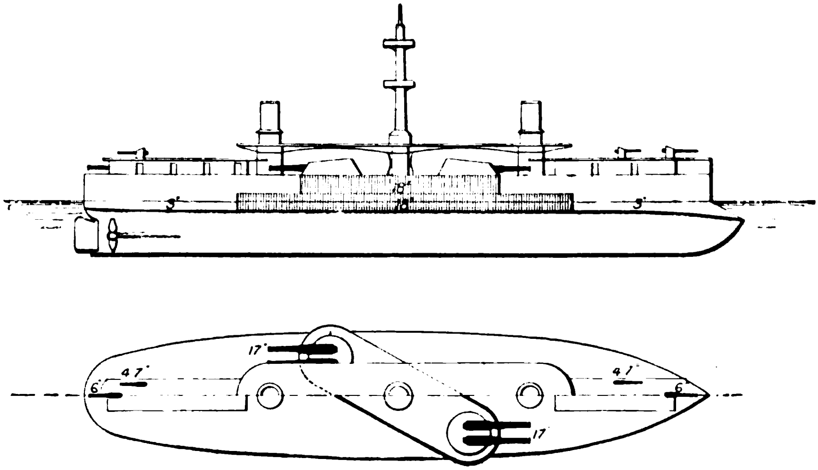
GREECE.

Hydra. Psara. Spetsai.



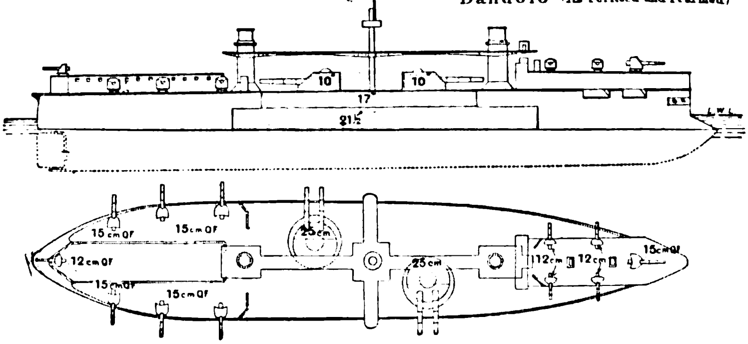
ITALY.

Andrea Doria
Francesco Morosini.
Ruggiero di Lauria.



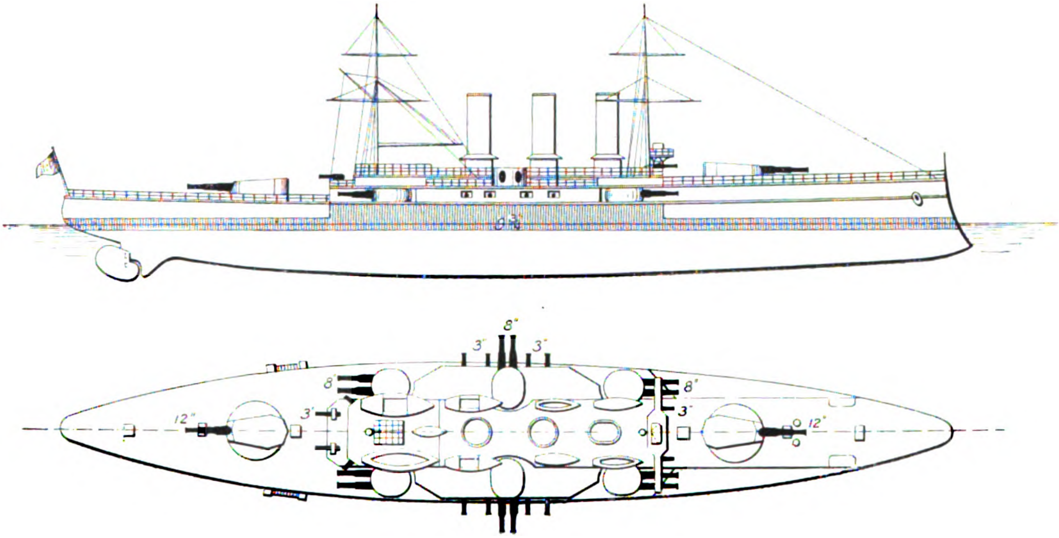
ITALY.

"Duilio" (not rearmed)
"Dandolo" (As refitted and rearmed)

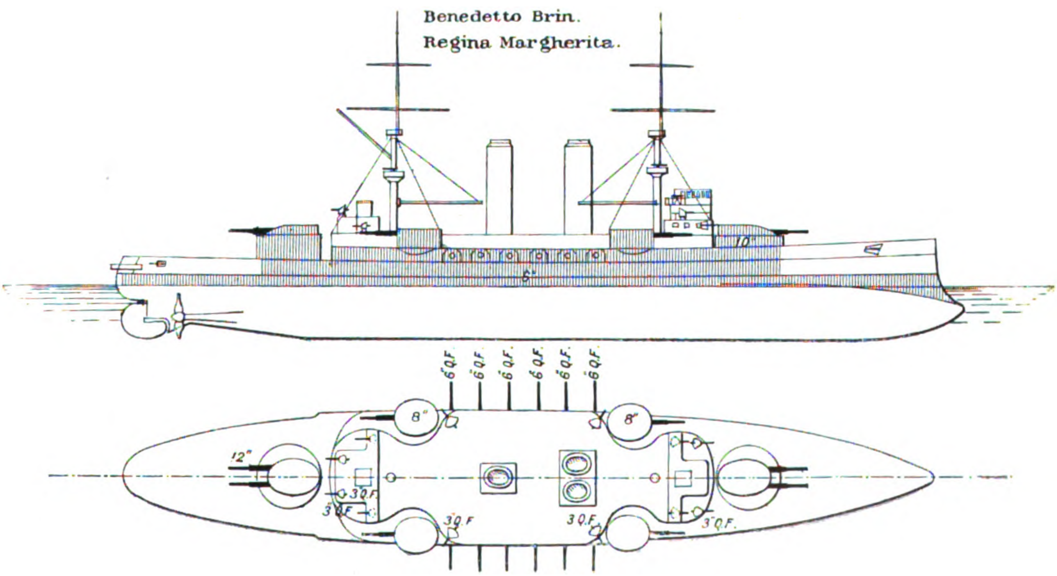


ITALY.

Vittorio Emanuele
Regina Elena.



Benedetto Brin.
Regina Margherita.



"Guiseppe Garibaldi"
"Varese"
"Francesco Ferrucio."

ITALY

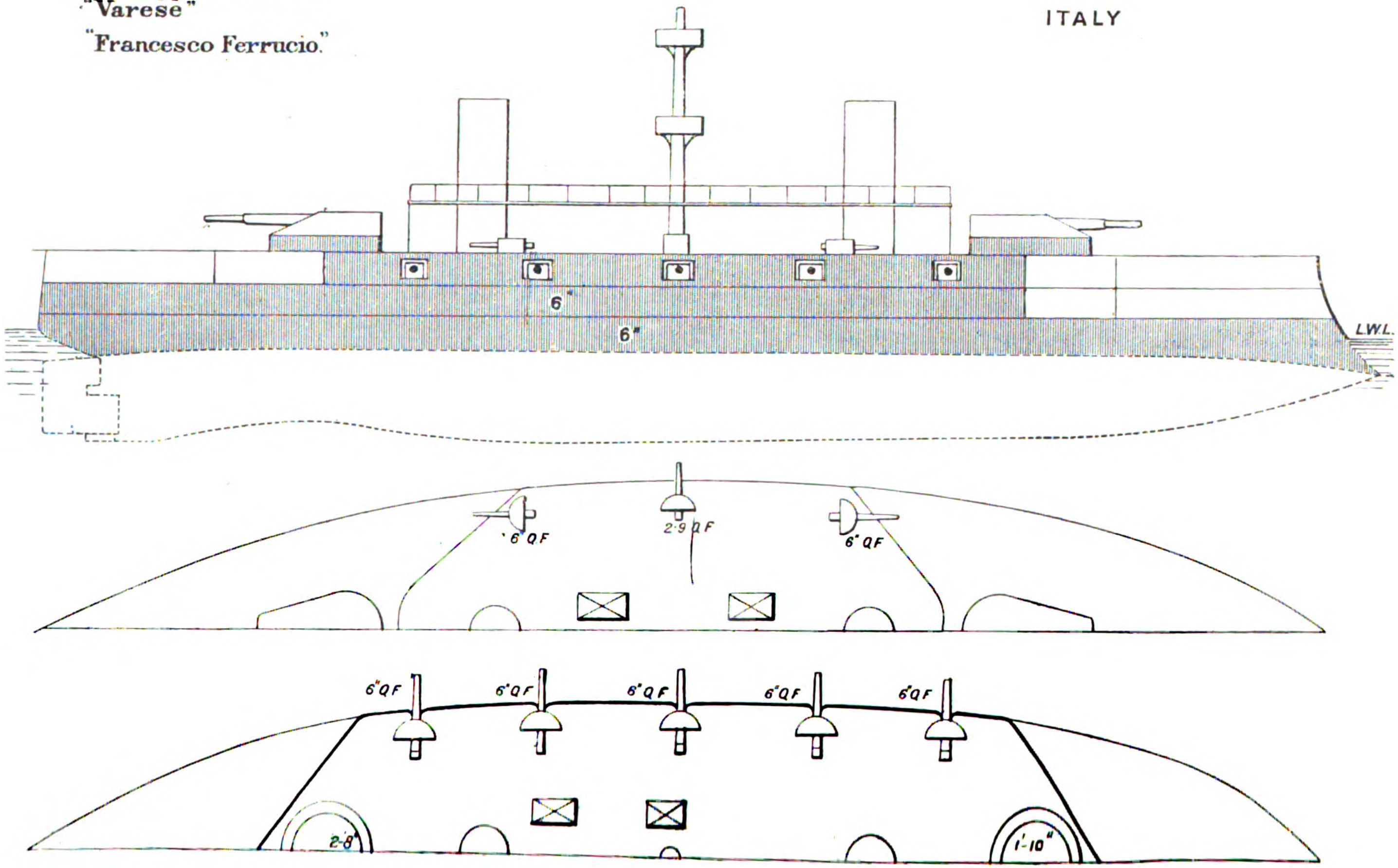
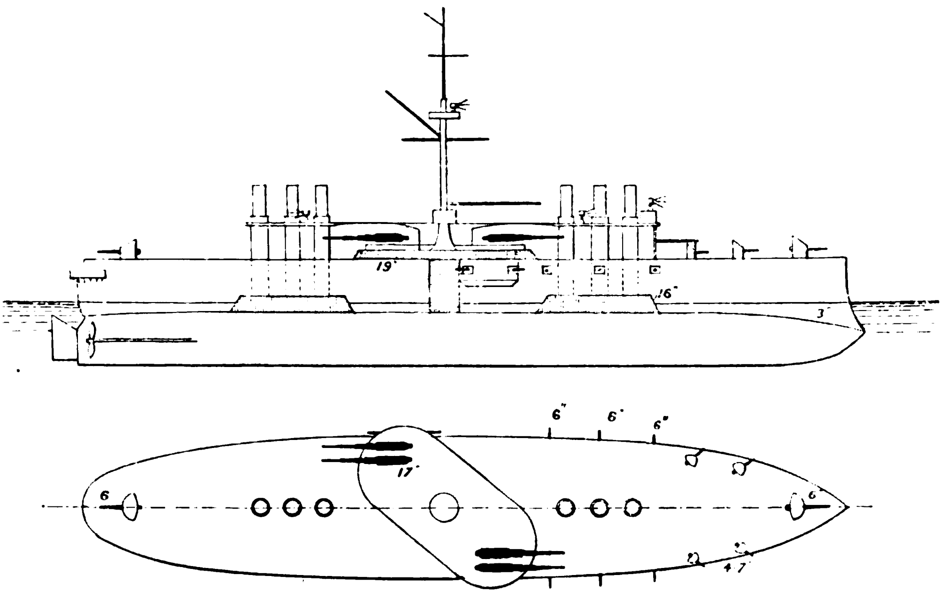


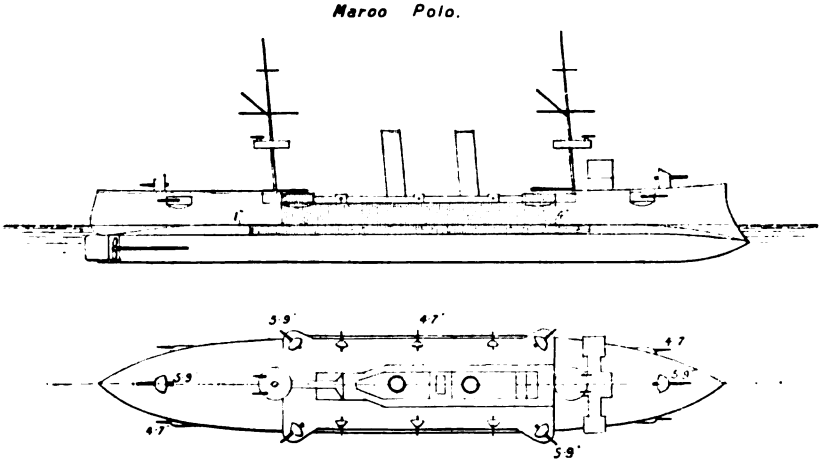
PLATE 52.

ITALY.

Italia.
Lepanto.

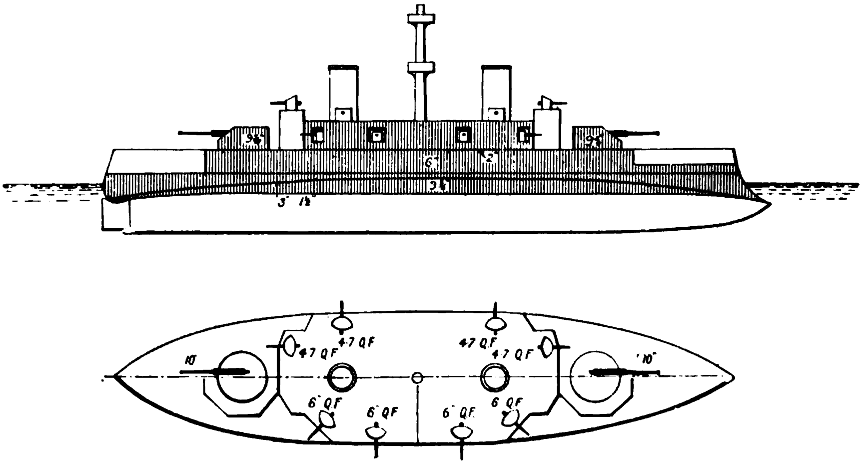


Marco Polo.

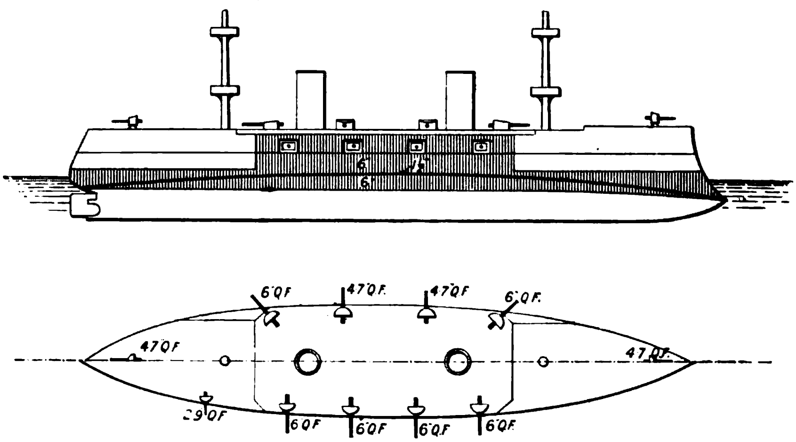


ITALY.

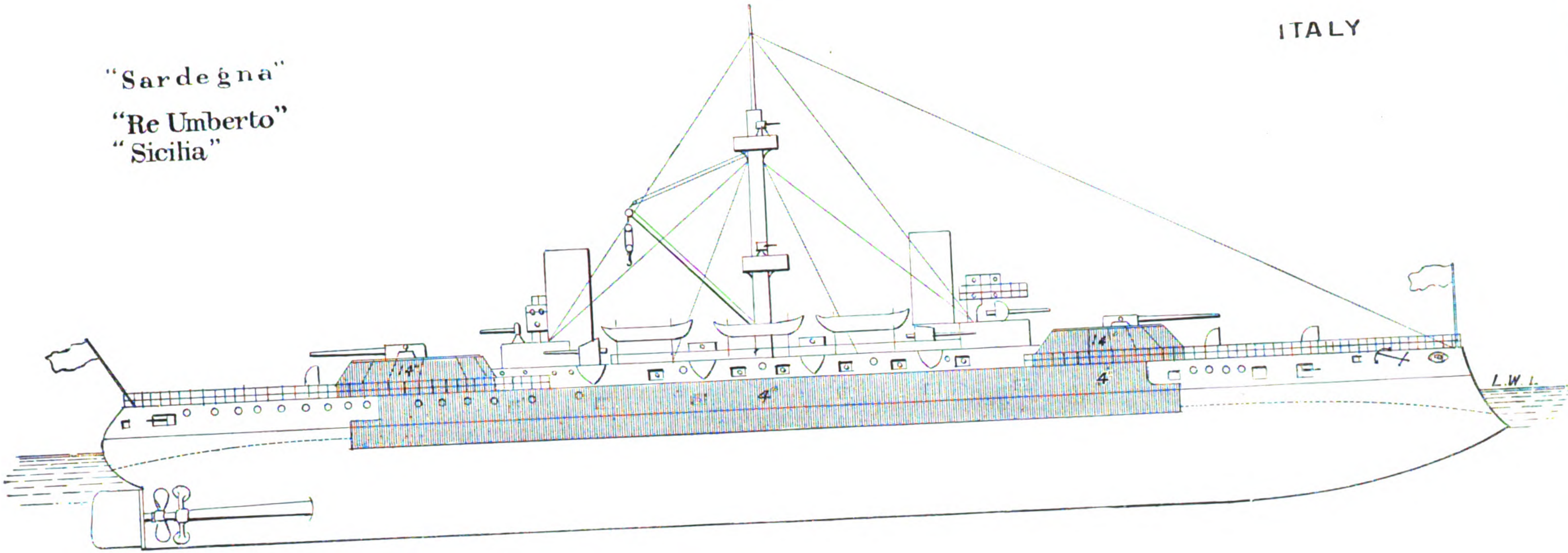
Ammiraglio Di St. Bon.
Emanuele Filiberto



"Carlo Alberto"
"Vettor Pisani"



"Sardegna"
"Re Umberto"
"Sicilia"



Note. *Sardegna is 9 ft. 10 in. longer and 3 ft. 3 in. broader than the other two.*

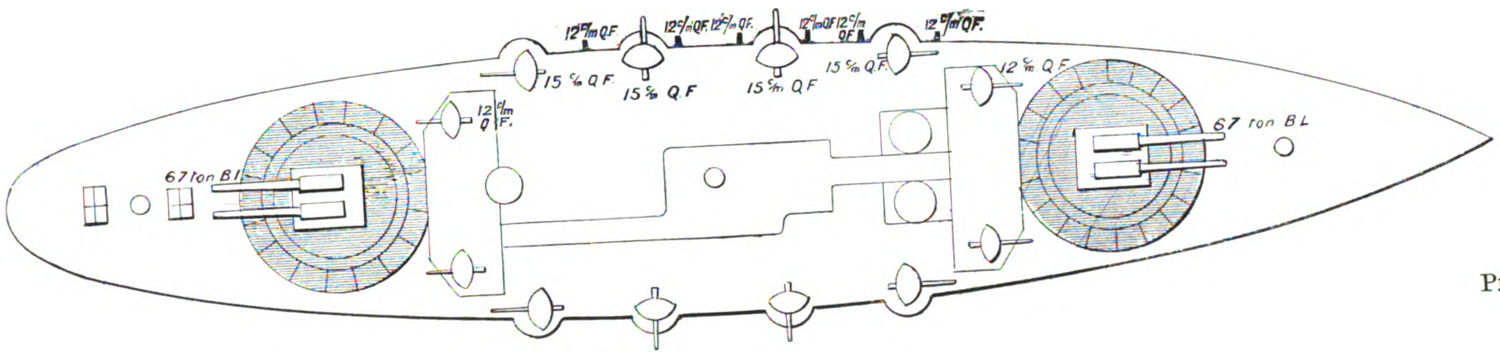
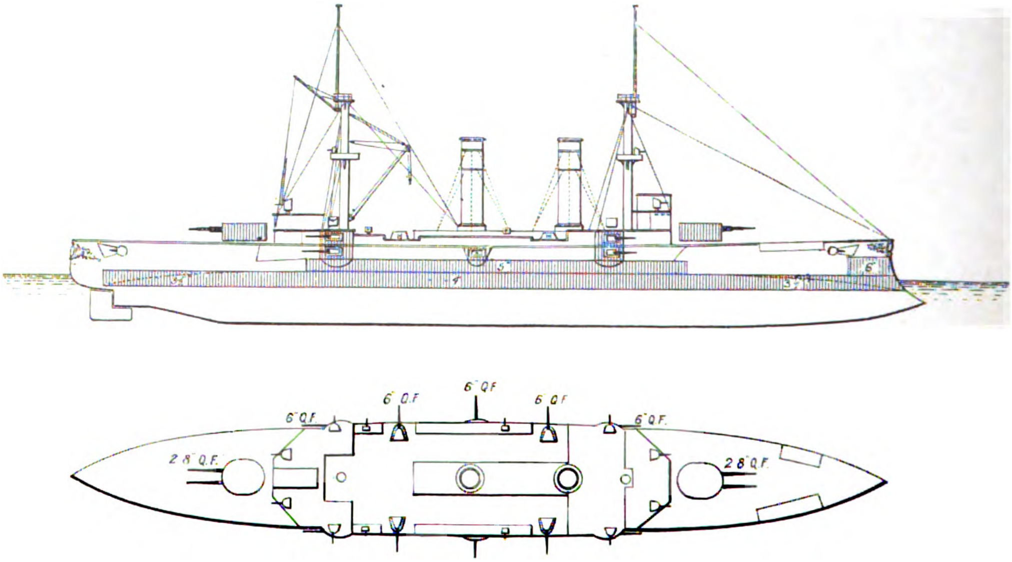


Plate 55.

JAPAN.

Asama and Tokiwa



TAKASAGO.

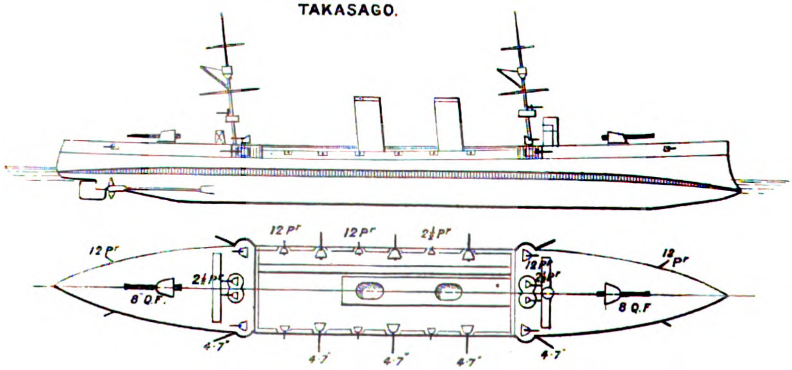
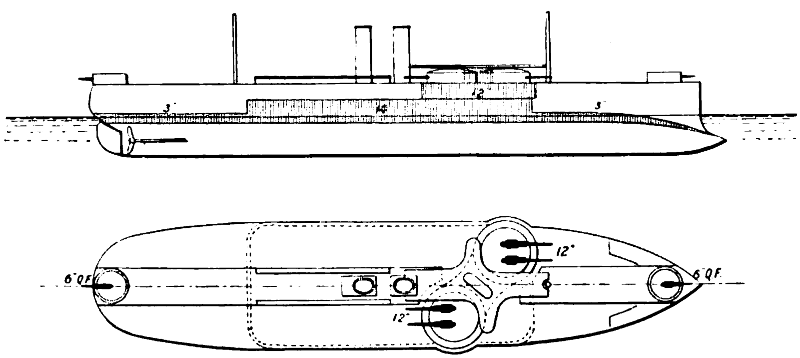


Plate 56.

JAPAN.

Chin Yuen.



Itsukusima.
Hashidate.

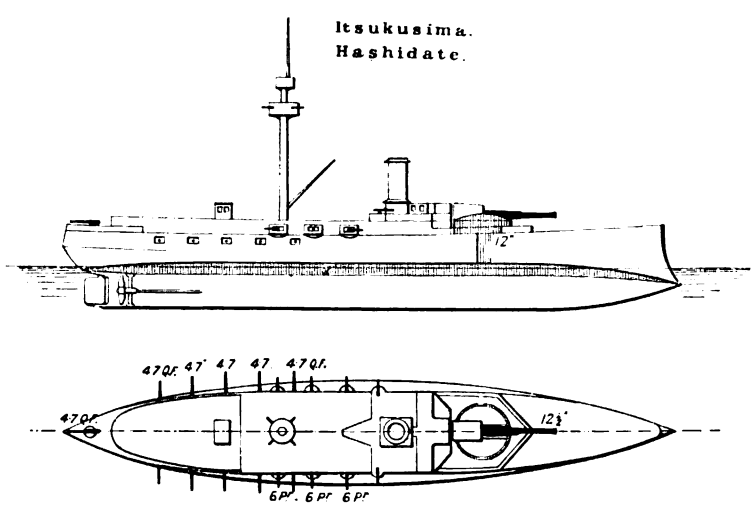
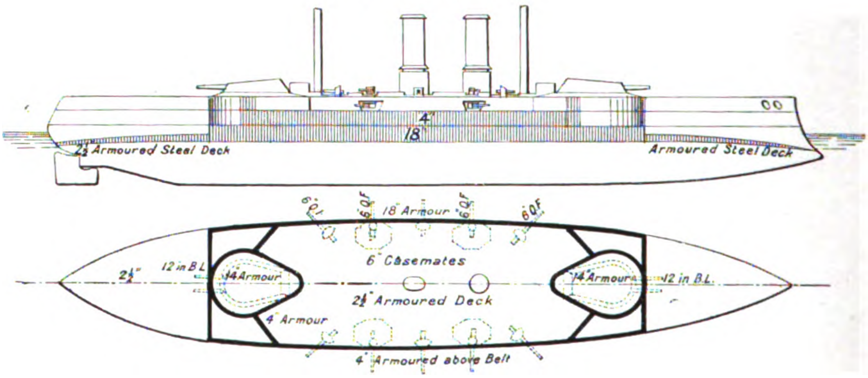


PLATE 57.

JAPAN

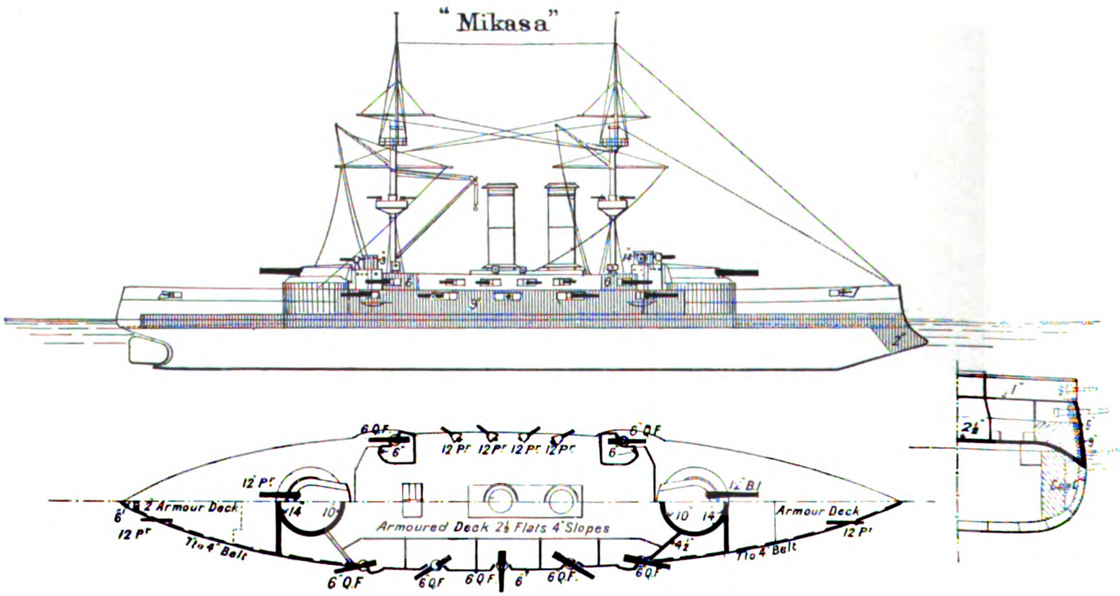
First Class Battleship

"Fuji."
"Yashima."



BATTLESHIP

"Mikasa"



Japan.

BATTLE-SHIP.
"Hatsuse."
15,000 Tons. 14,500 I.H.P.

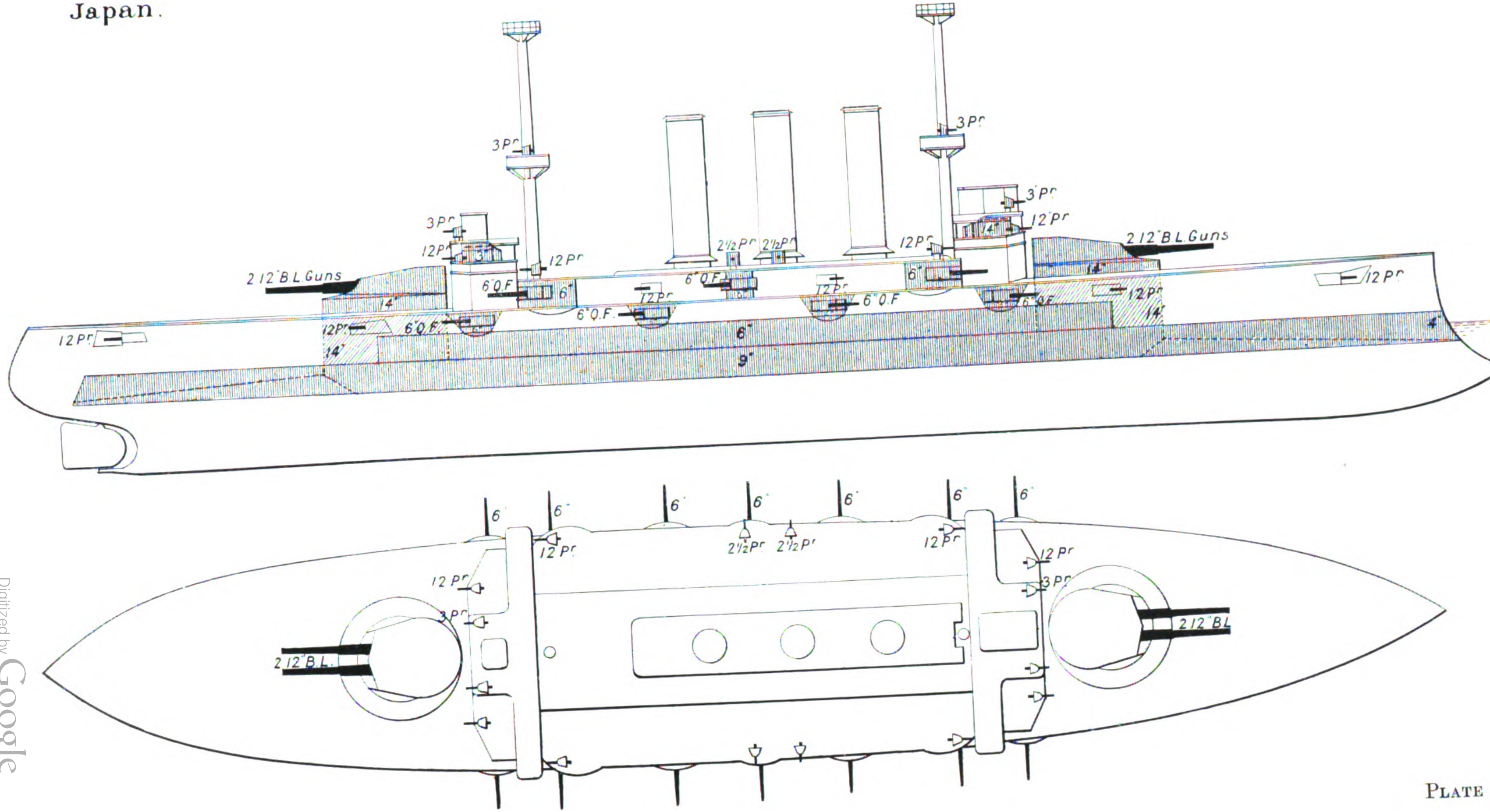
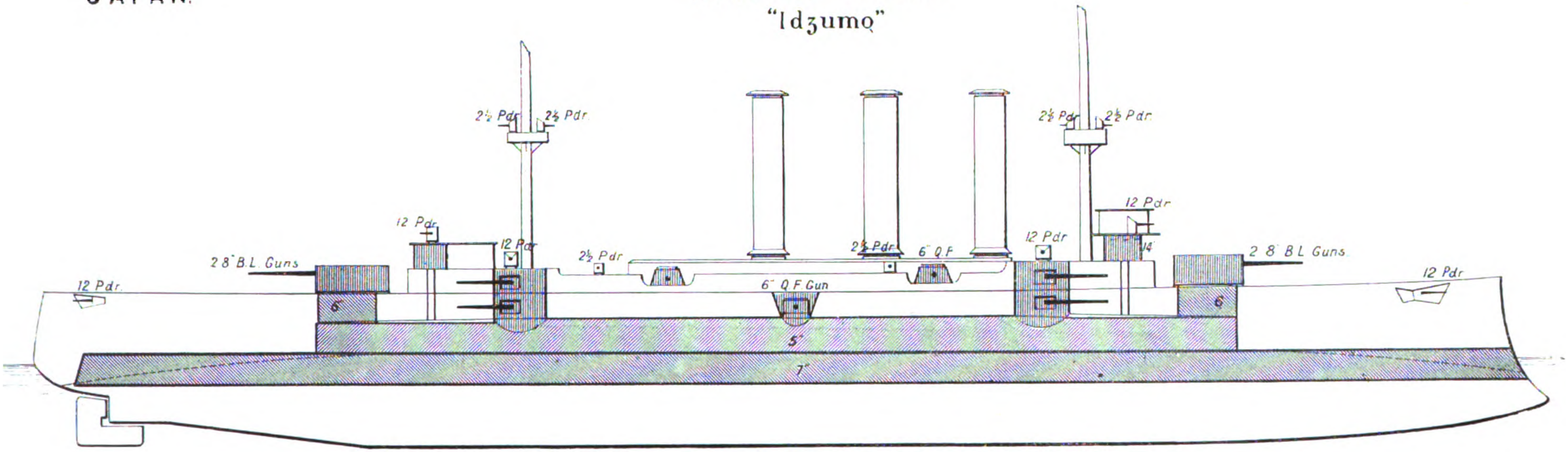


PLATE 59.

JAPAN.

ARMOURED CRUISER.

"Idzumo"



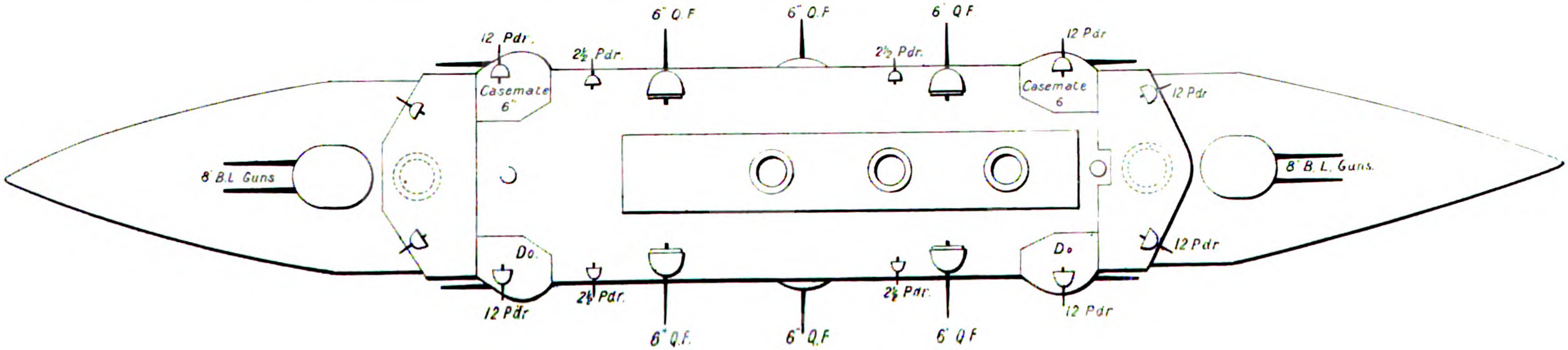
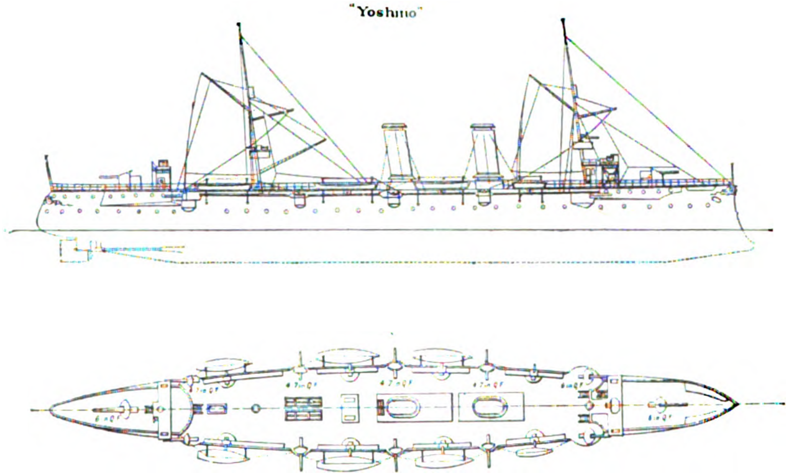


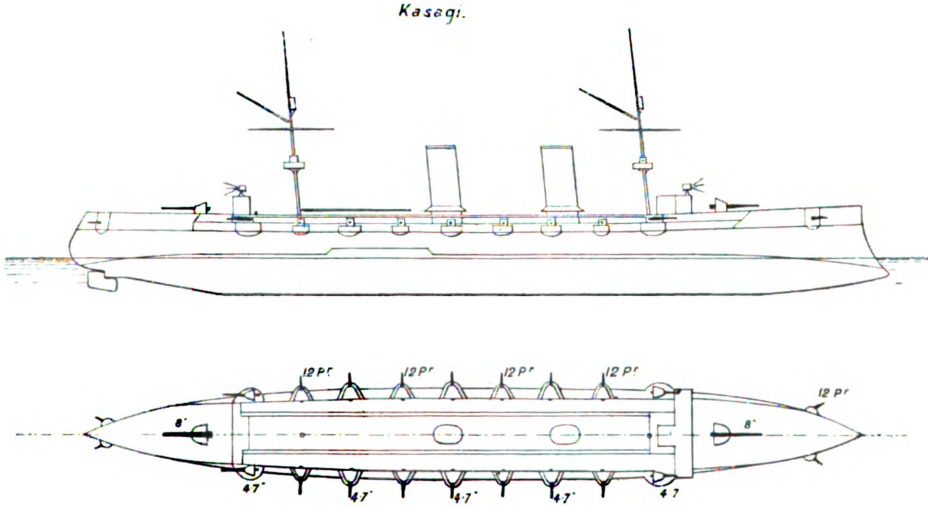
PLATE 60.

JAPAN.

"Yoshino"

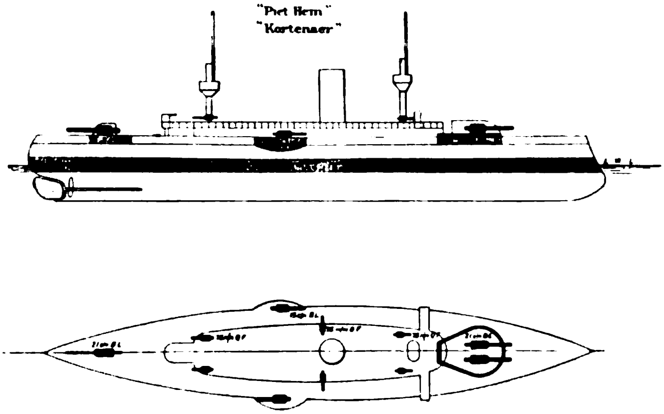


Kasagi.

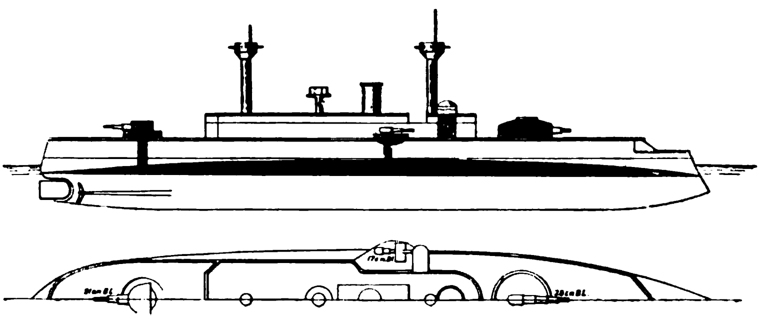


NETHERLANDS.

"Evertsen"
"Piet Hein"
"Kortenaer"

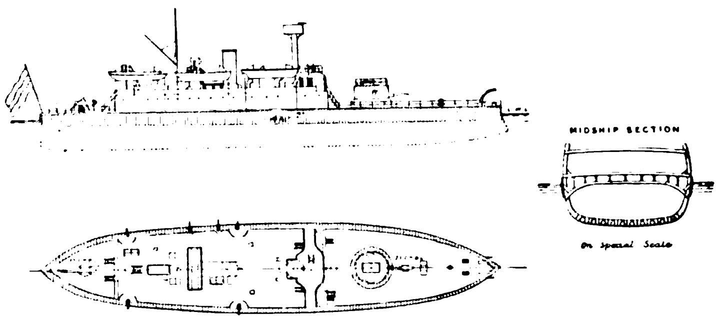


Koningin Wilhelmina de Nederlanden

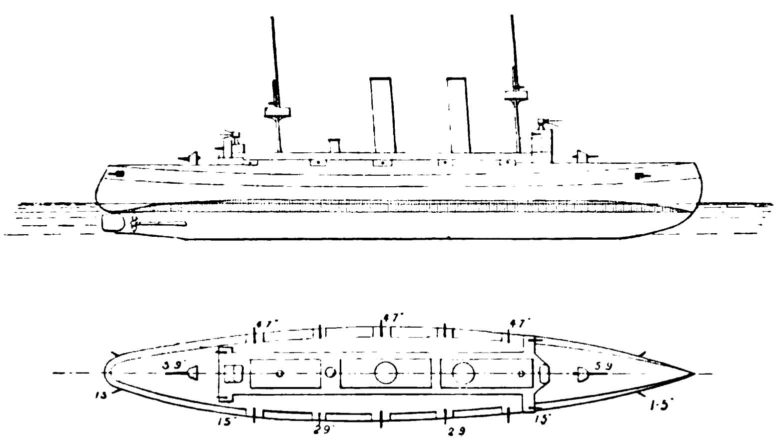


NETHERLANDS.

"Reinier Claesen"

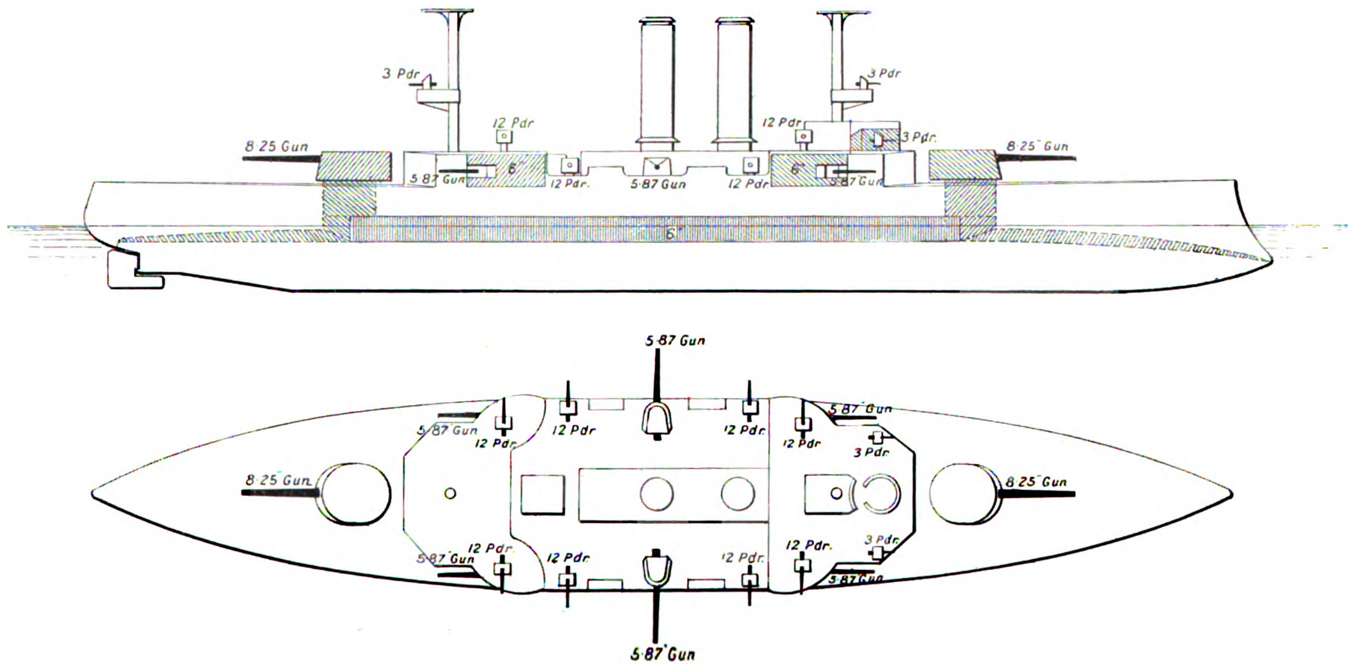


Holland



NORWAY.

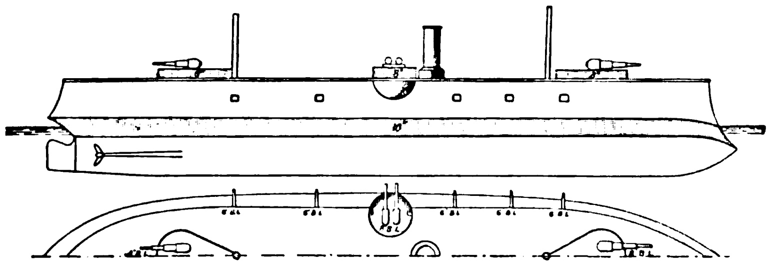
ARMOUR-CLADS.
"Norge"
"Eidsvold"



RUSSIA.

ARMOURED CRUISER

"Admiral Nachimoff"



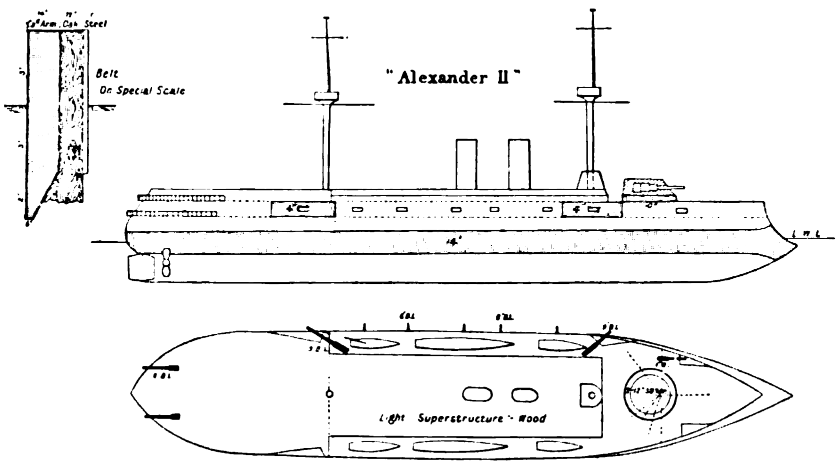


PLATE 65.

RUSSIA.

"Catherine II."
"Tchsmé."
"Sinope."

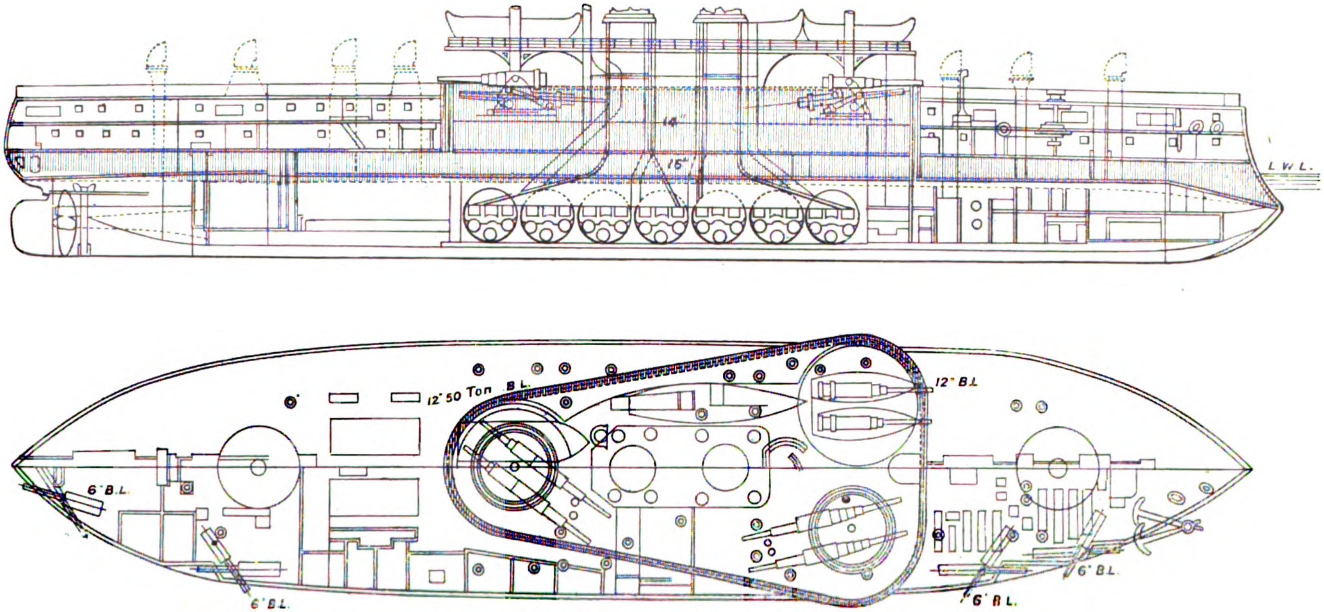
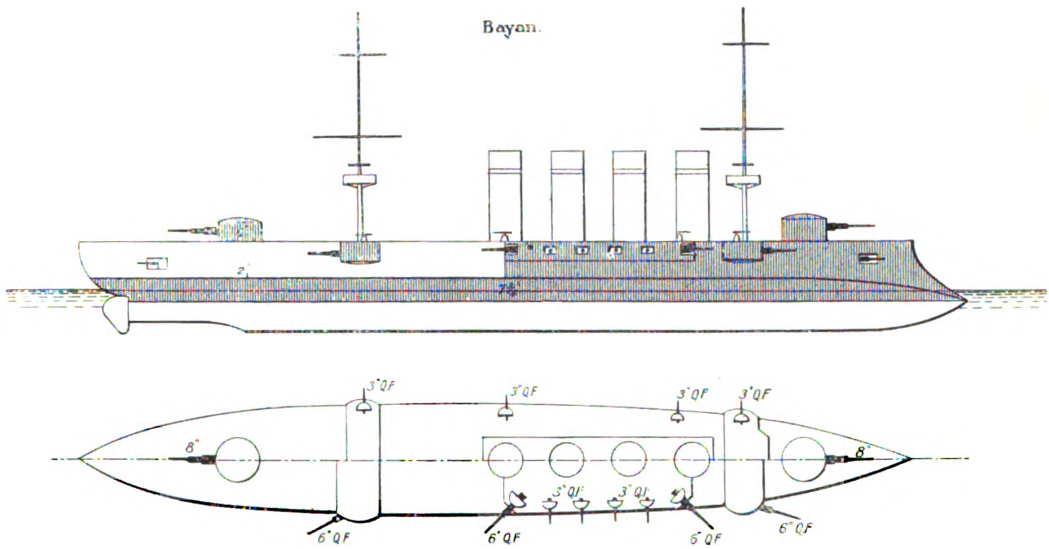


Plate 66.

RUSSIA.

Bayan.



Tsarevitch

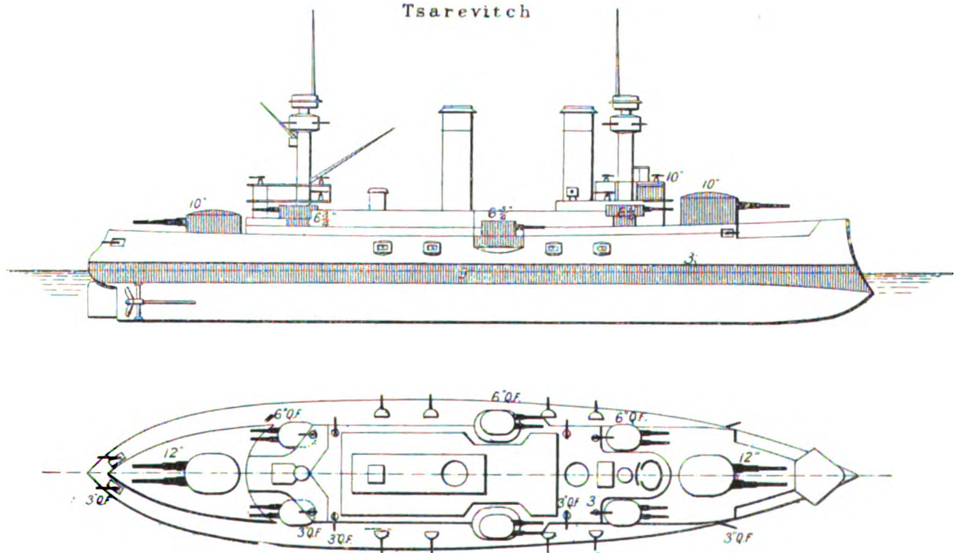


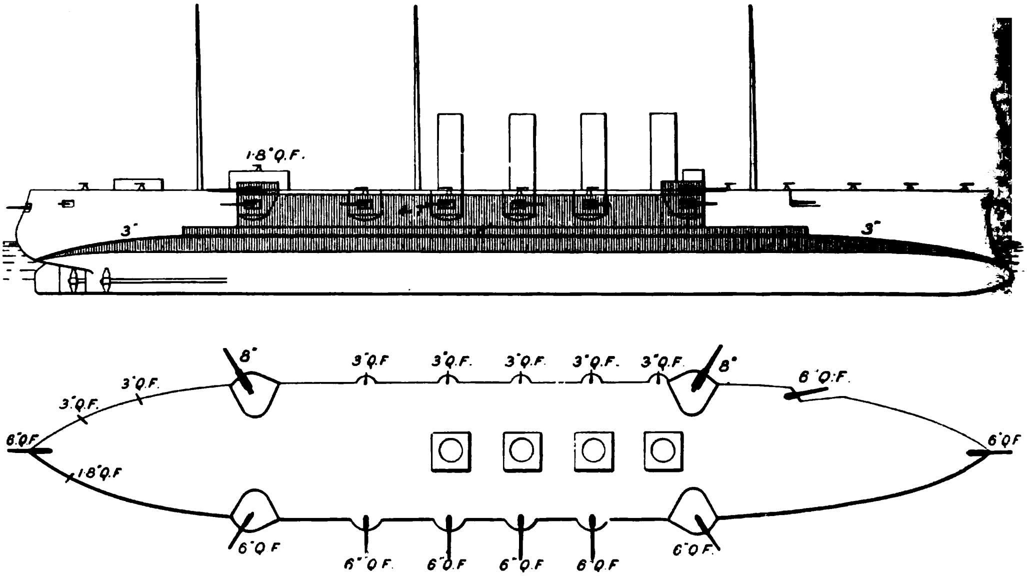
Plate 67.

f 2

Russia.

ARMOURED CRUISER.

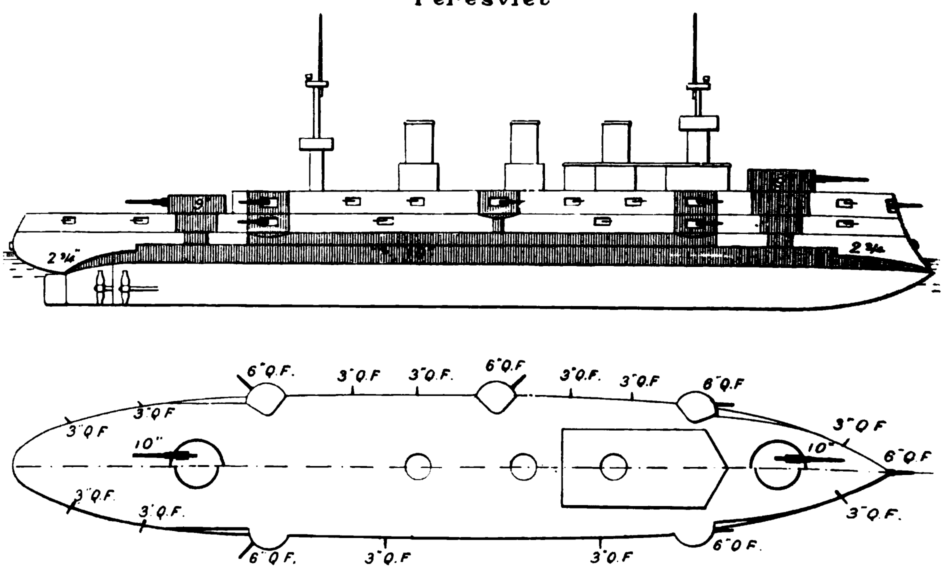
"Gromoboi."



Russia.

FIRST CLASS BATTLE-SHIPS

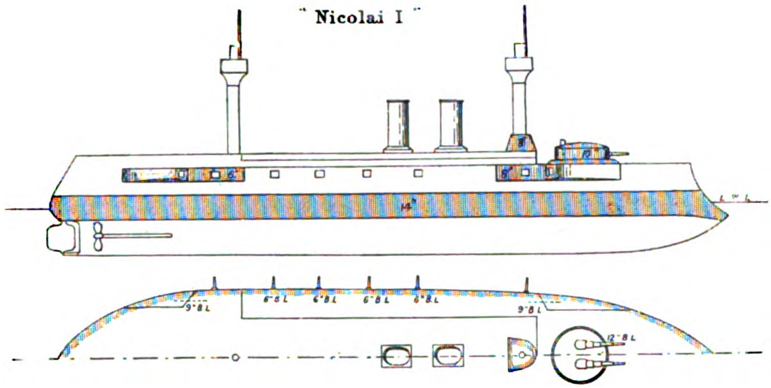
"Oslabya"
"Peresviet"



RUSSIA.

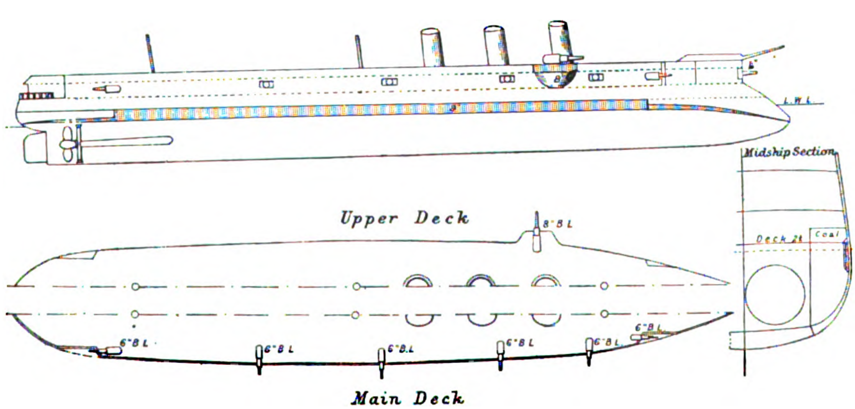
BATTLE SHIP

" Nicolai I "



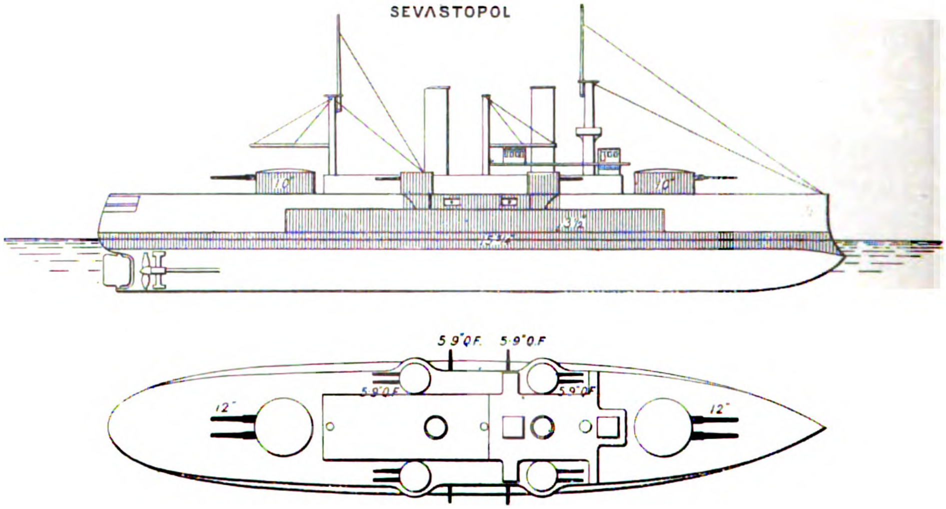
ARMOURED CRUISER

" Pamyat Azova."



RUSSIA.

PETROPAVLOVSK
POLTAVA
SEVASTOPOL



Pallada

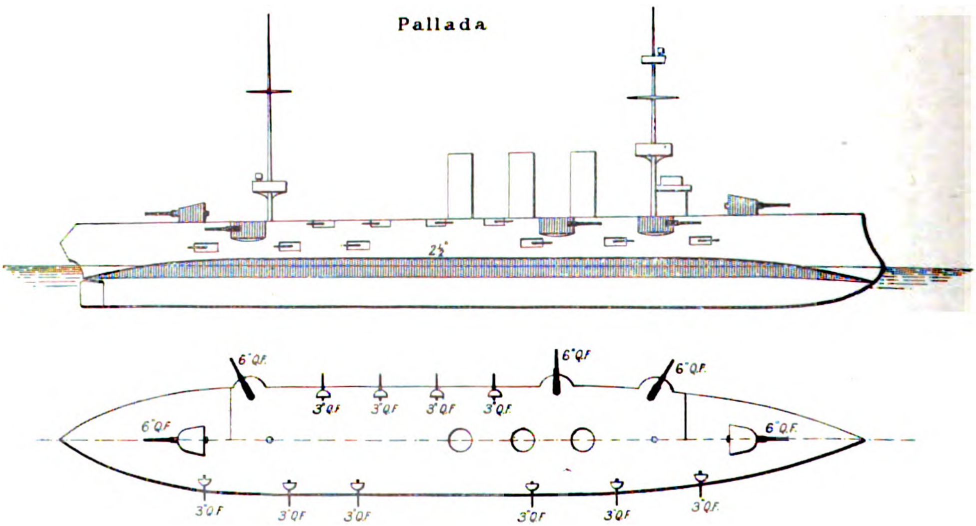
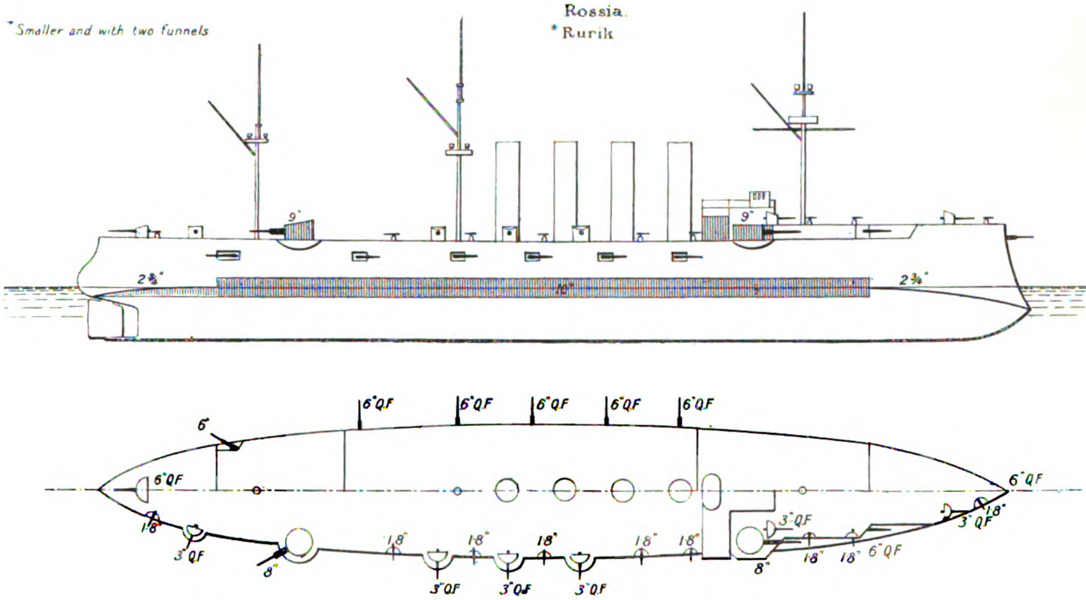


PLATE 70.

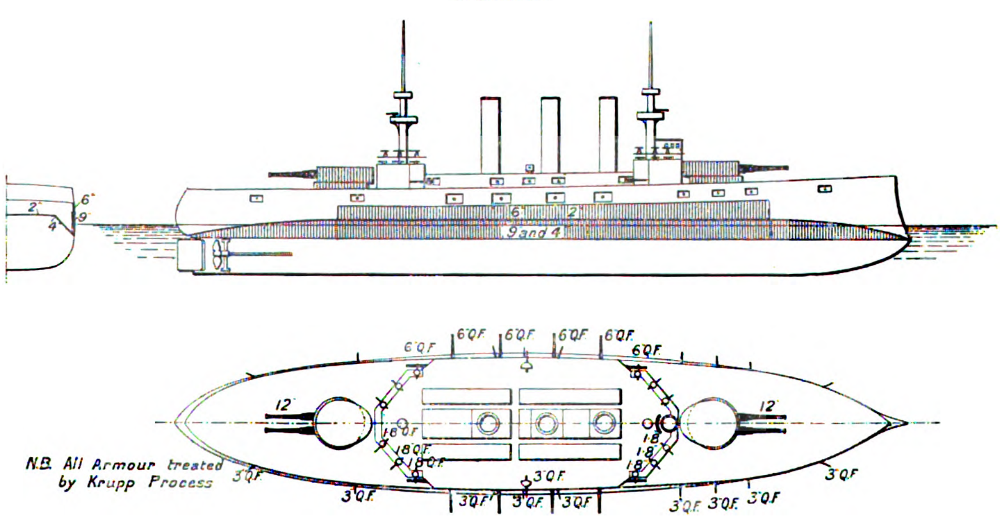
RUSSIA.

Rossia.
*Rurik

*Smaller and with two funnels

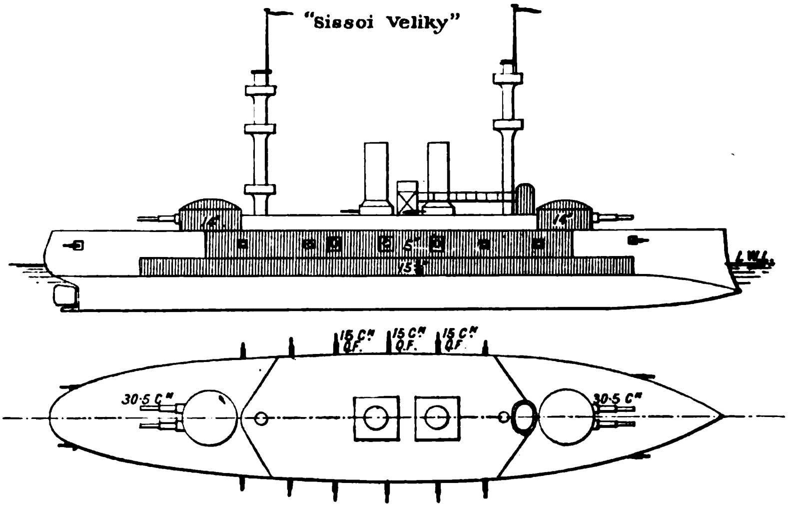


"Retwisan"

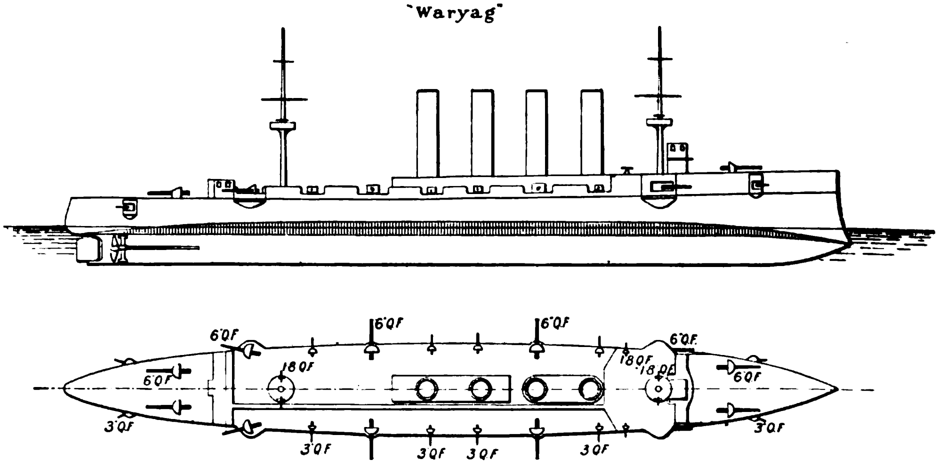


N.B. All Armour treated by Krupp Process

"Sissoi Veliky"



"Waryag"



RUSSIA.

"Tria Sviatitelia"

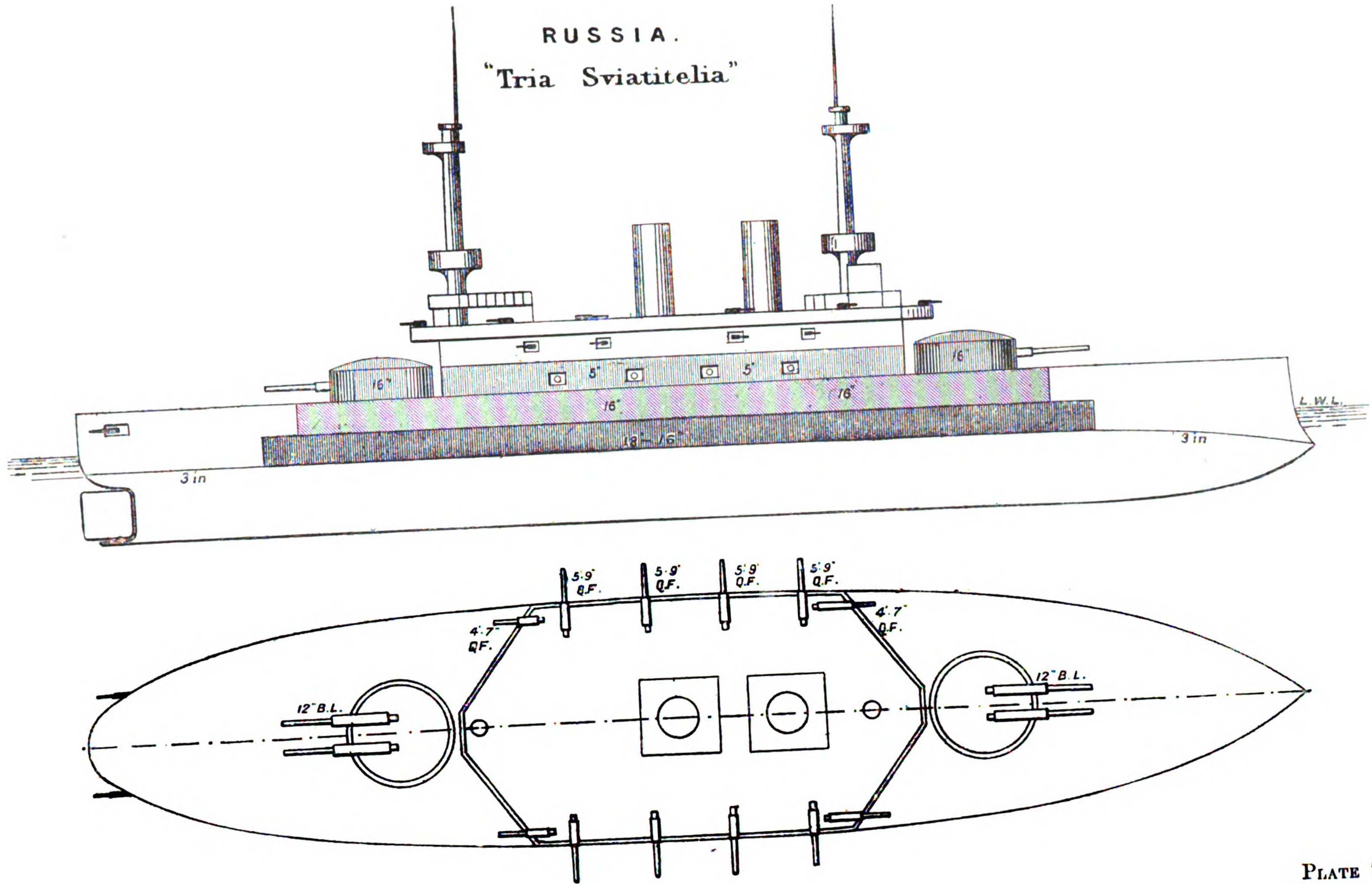


PLATE 73.

SPAIN

"Emperador Carlos V."

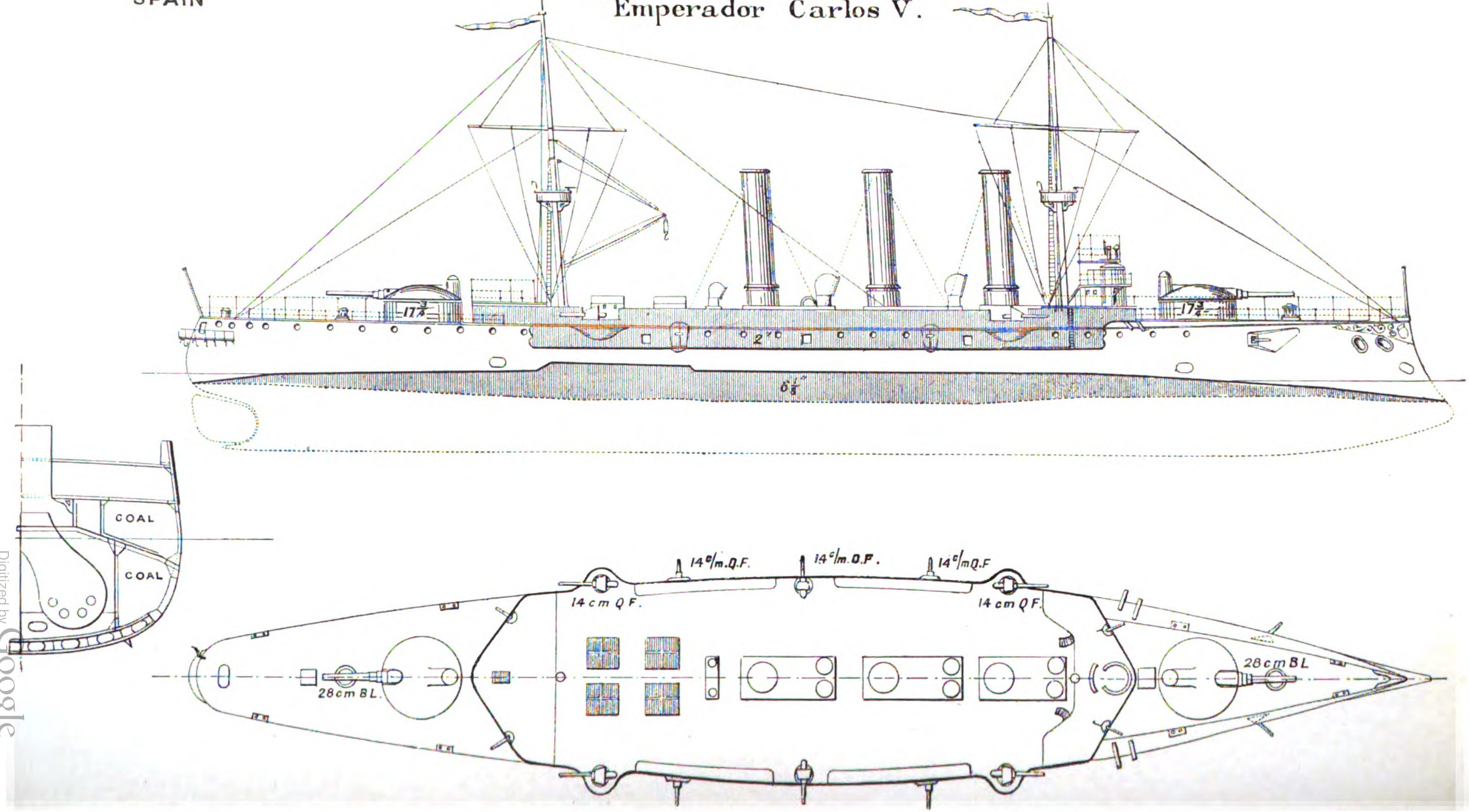
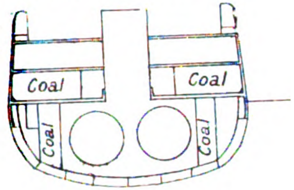


PLATE 74.

SPAIN

"Cataluña"
"Cardenal Cisneros"
"Princesa de Asturias"

Midship Section.



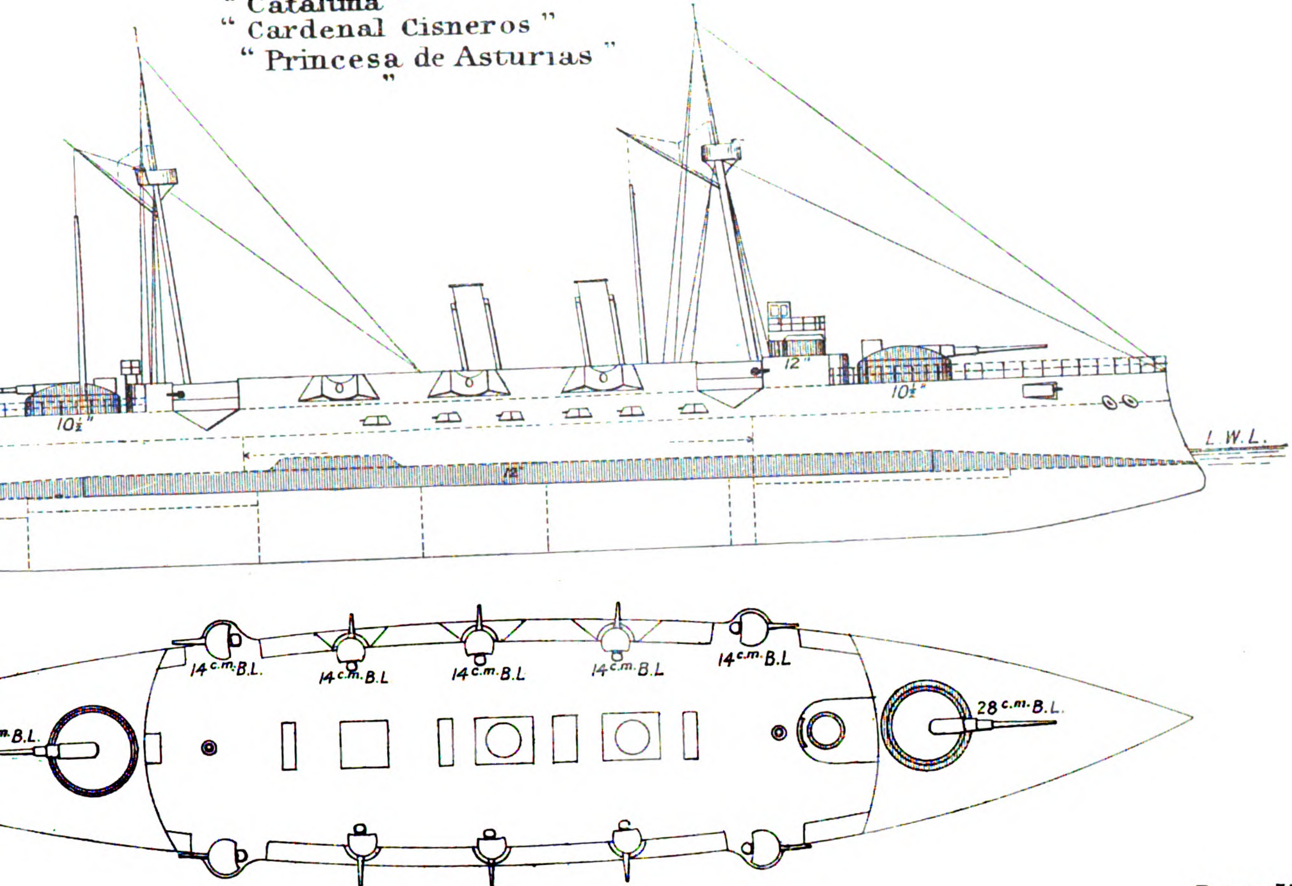


PLATE 75.

SPAIN

"Pelayo"

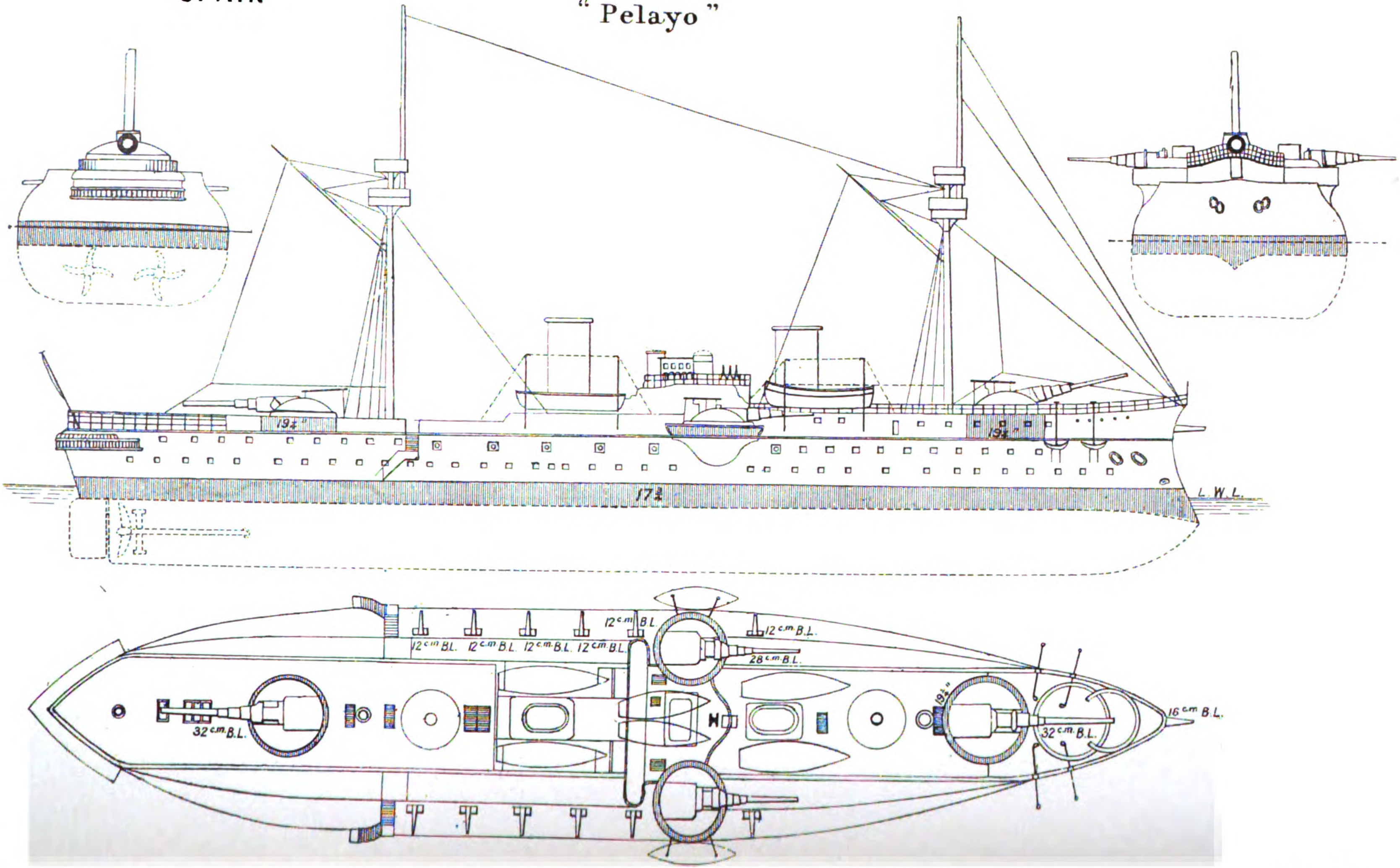


PLATE 76.

SWEDEN.

COAST DEFENCE SHIPS.
"A." "B." AND "C."

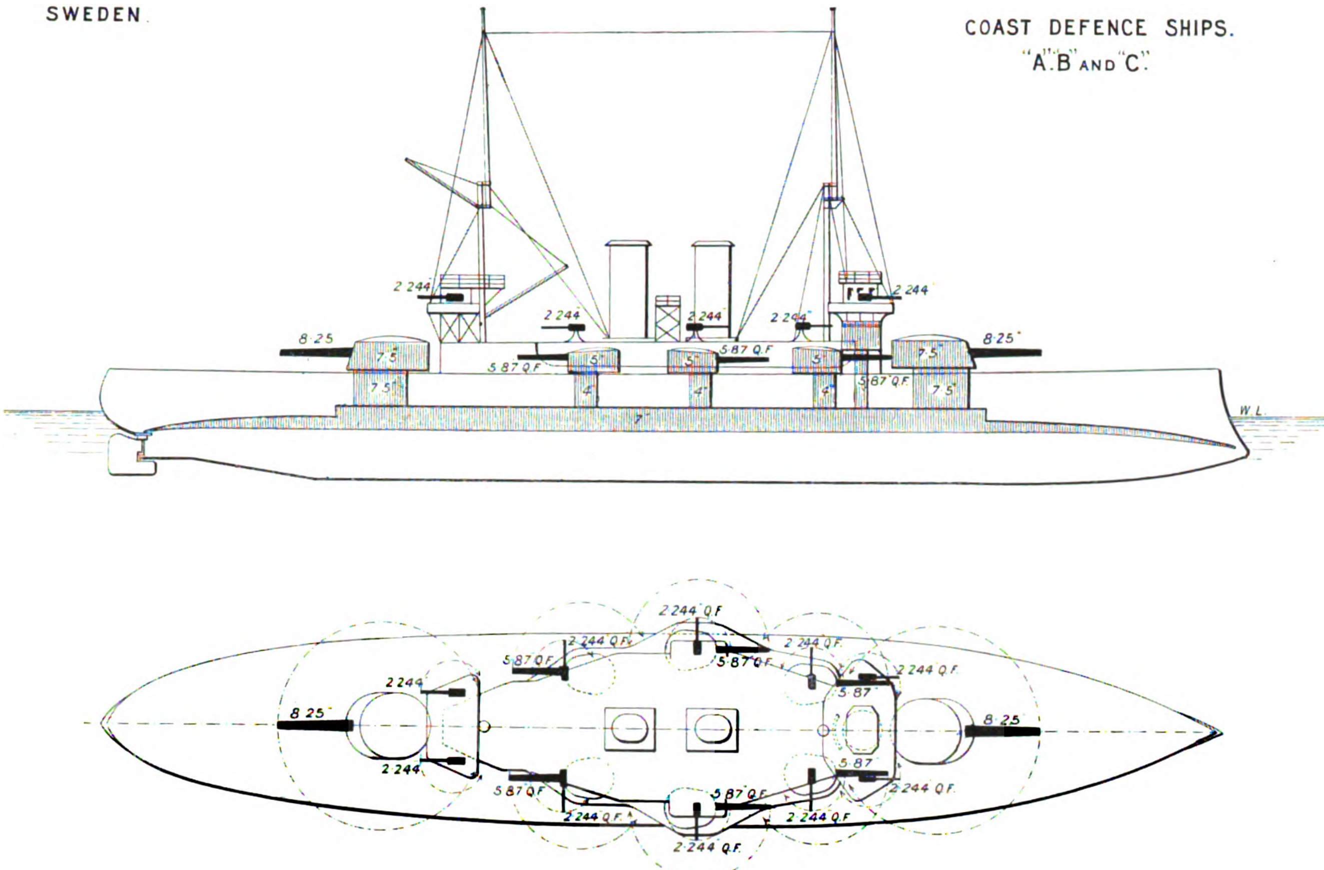
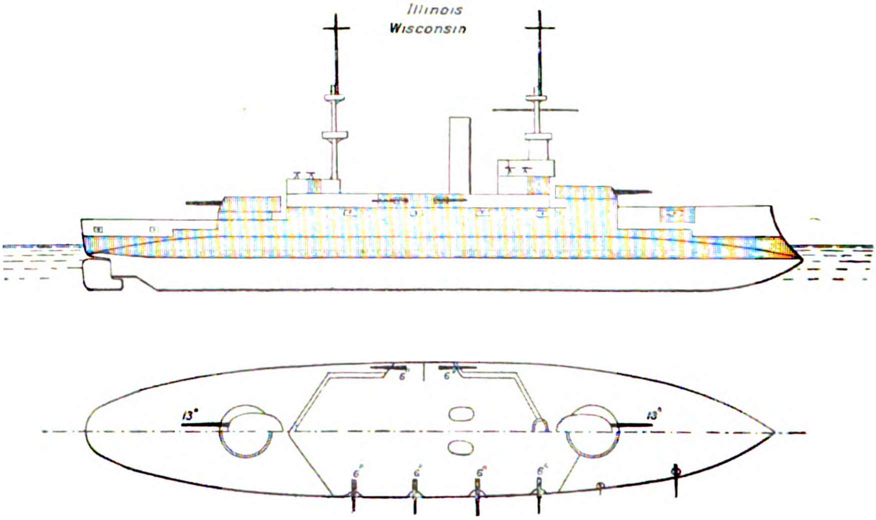


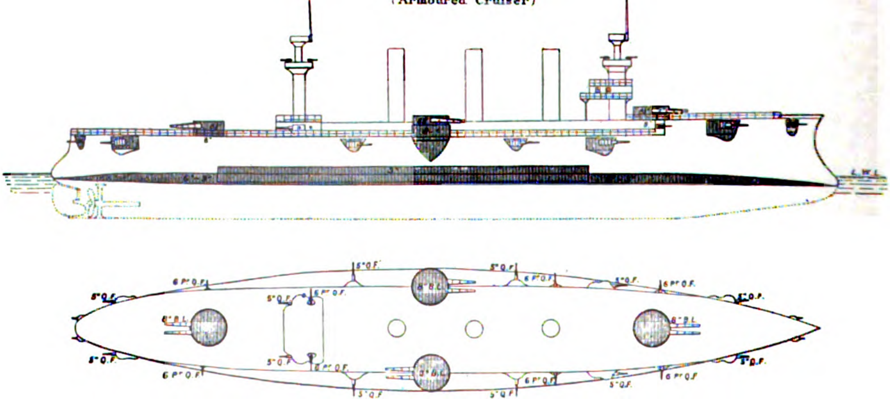
PLATE 77.

UNITED STATES.

Alabama
Illinois
Wisconsin

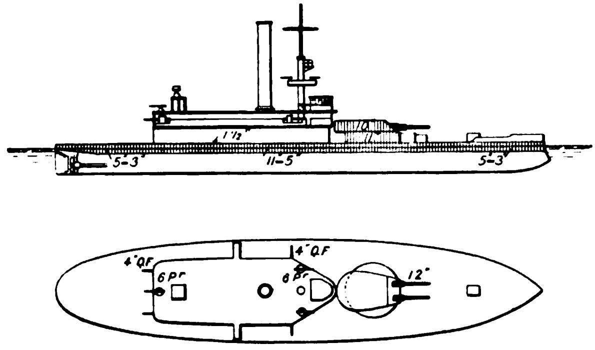


"Brooklyn"
(Armoured Cruiser)

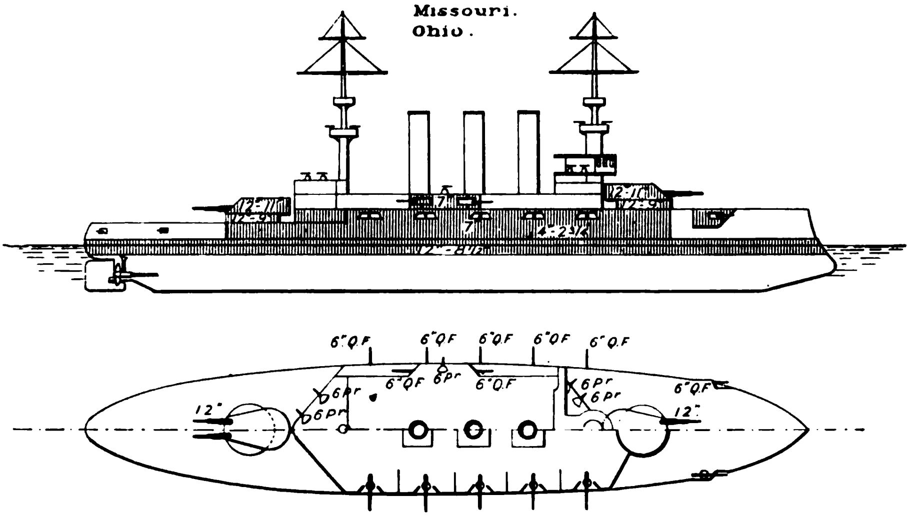


UNITED STATES.

ARKANSAS

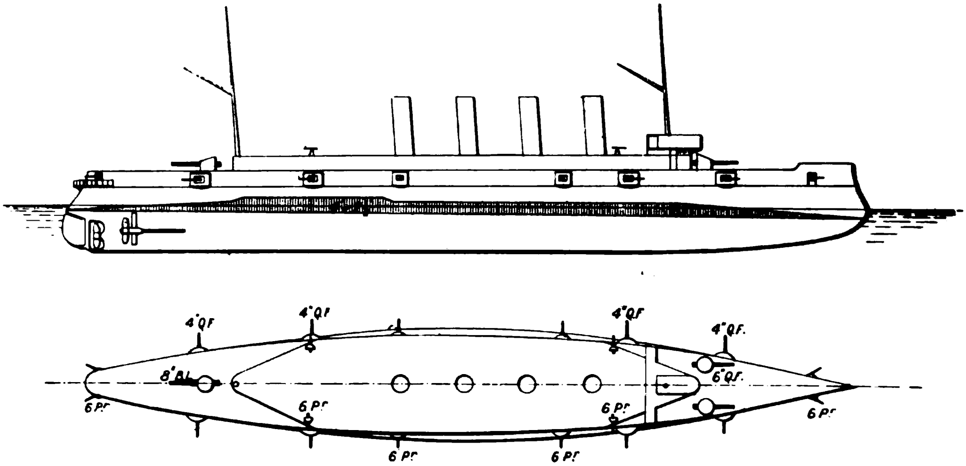


Maine
Missouri.
Ohio.



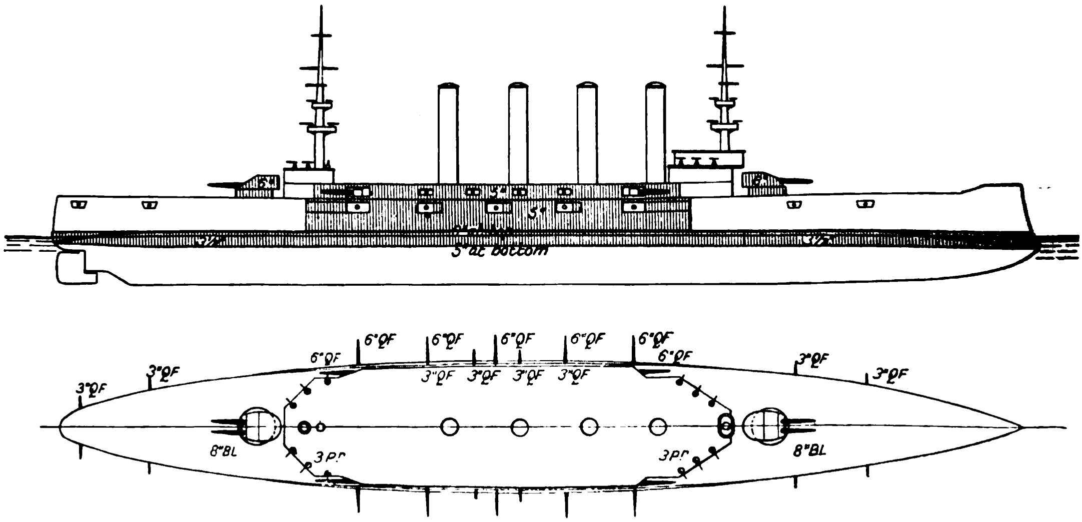
UNITED STATES.

Columbia.
Minneapolis



Note - *Minneapolis has only two funnels.*

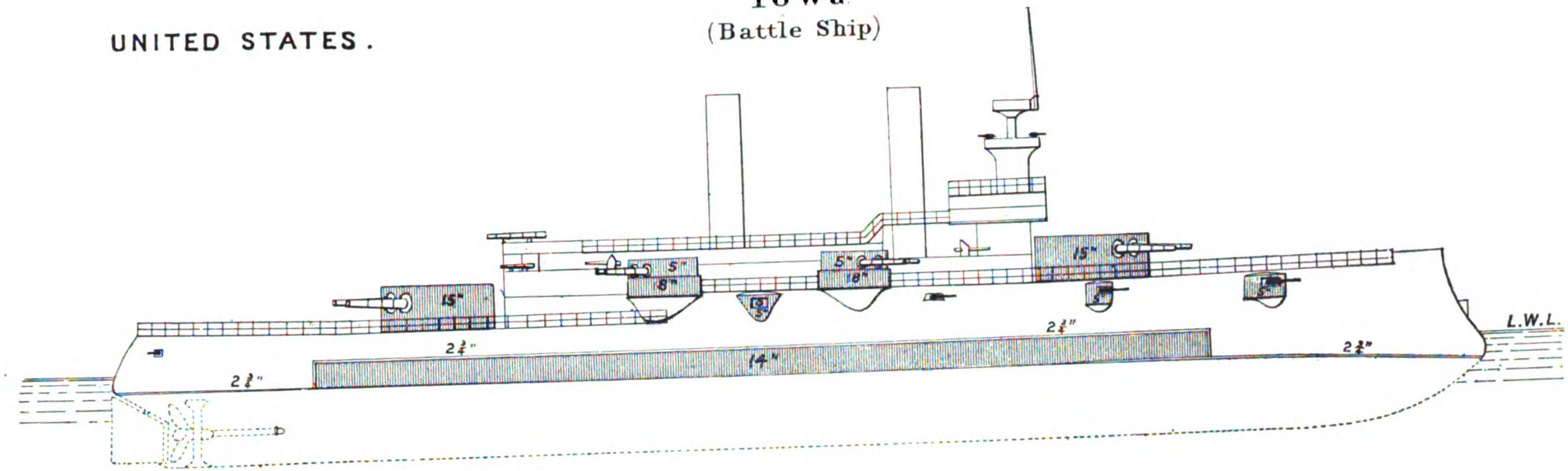
California.
Pennsylvania
West Virginia
Colorado.
Maryland.
South Dakota.



UNITED STATES.

"Iowa"

(Battle Ship)



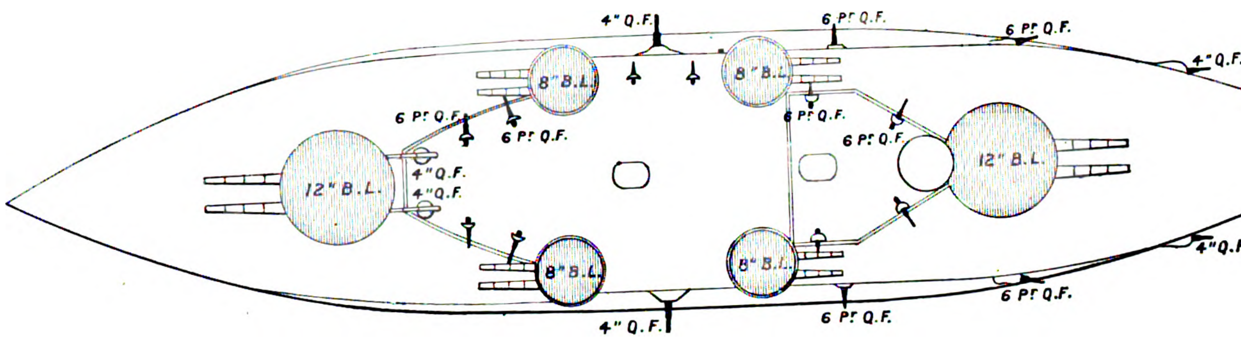
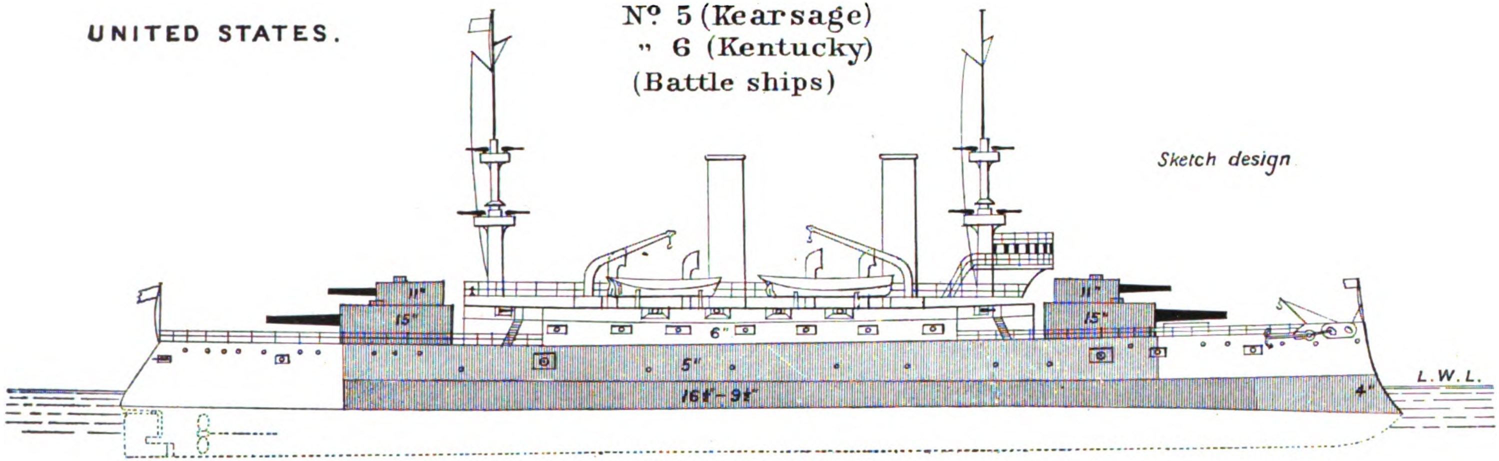


PLATE 81.

UNITED STATES.

No. 5 (Kearsage)
" 6 (Kentucky)
(Battle ships)



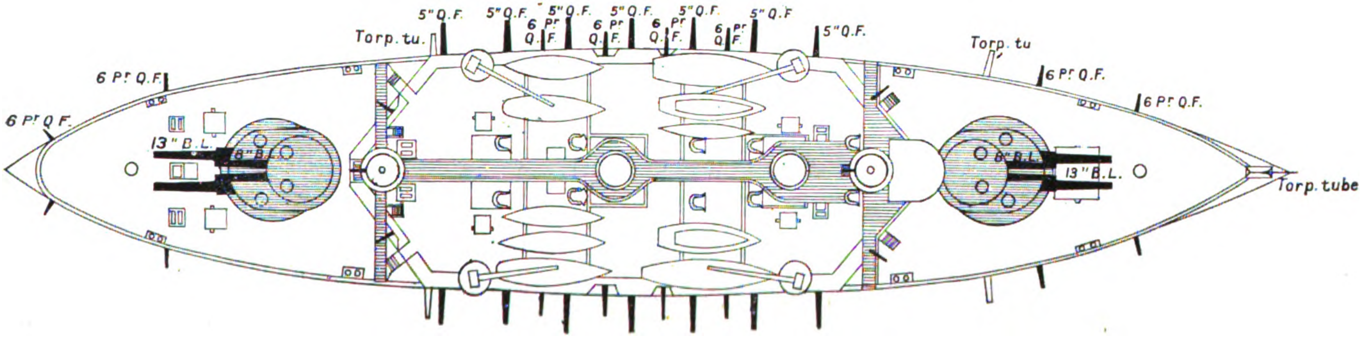
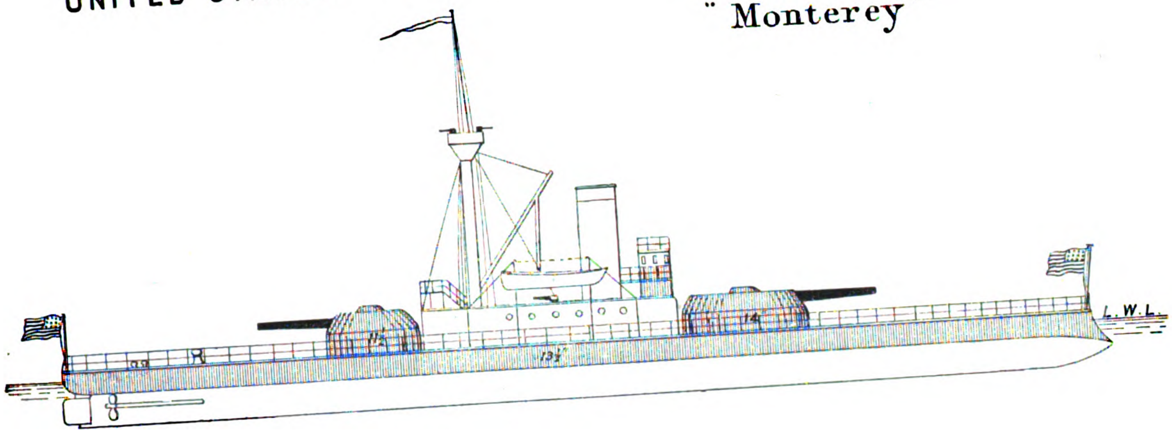
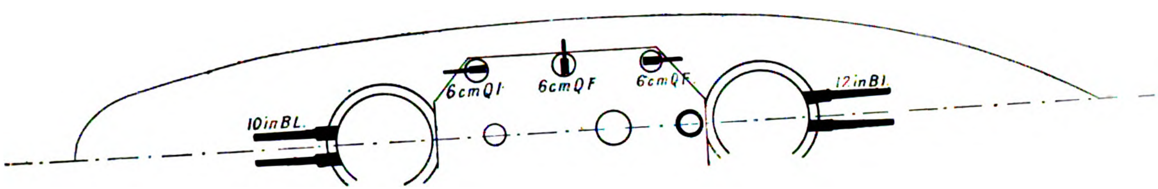


PLATE 82.

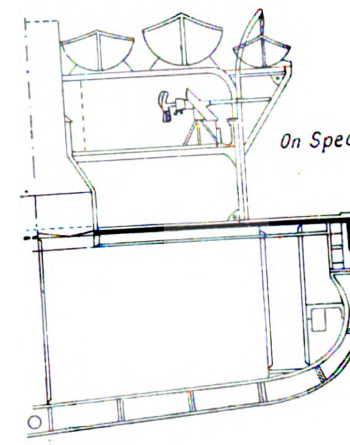
UNITED STATES

Coast Defence Ship
"Monterey"





Midship Section.



On Special Scale

PLATE 83.

UNITED STATES

BATTLE SHIPS.

"Oregon"
"Massachusets"
"Indiana"

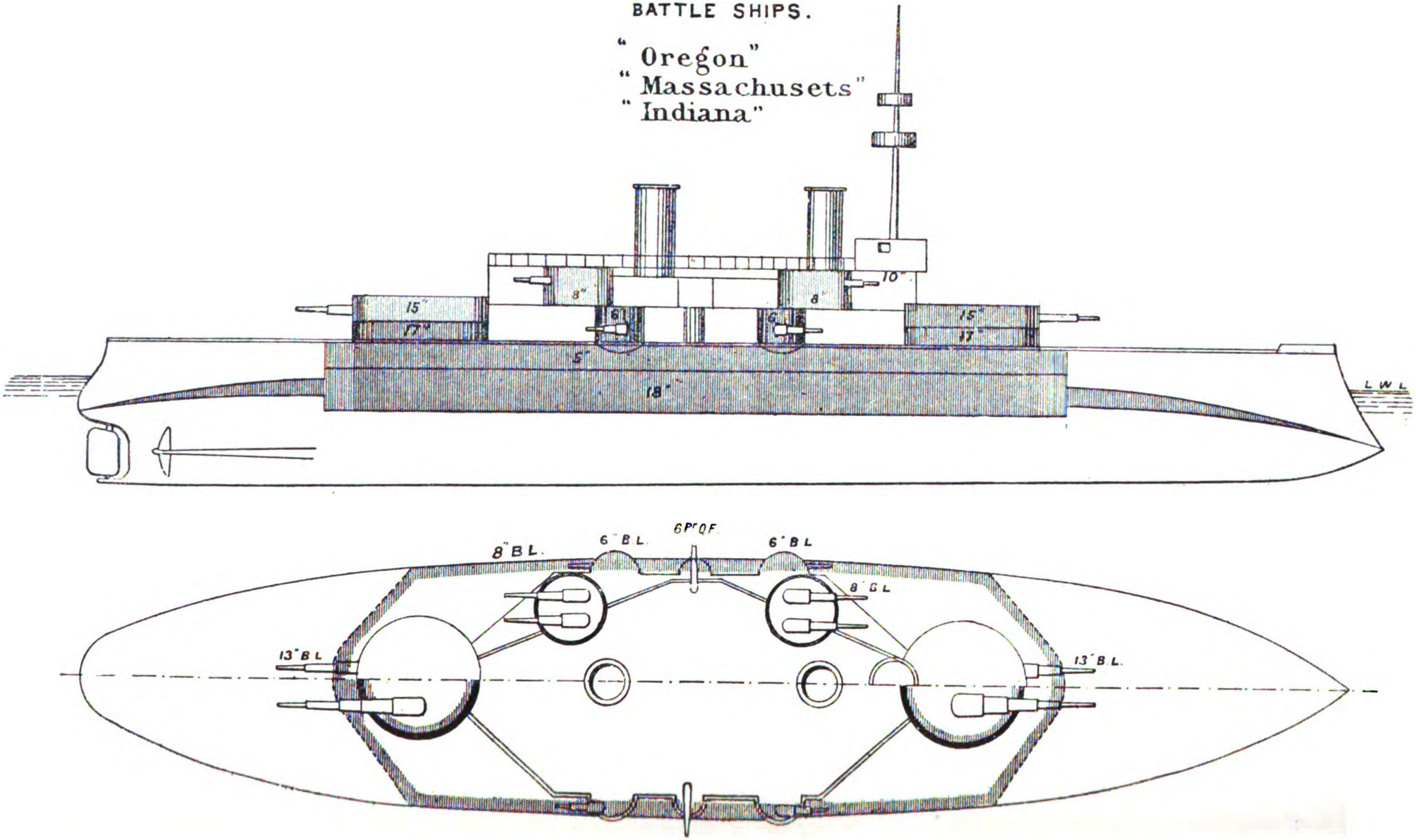
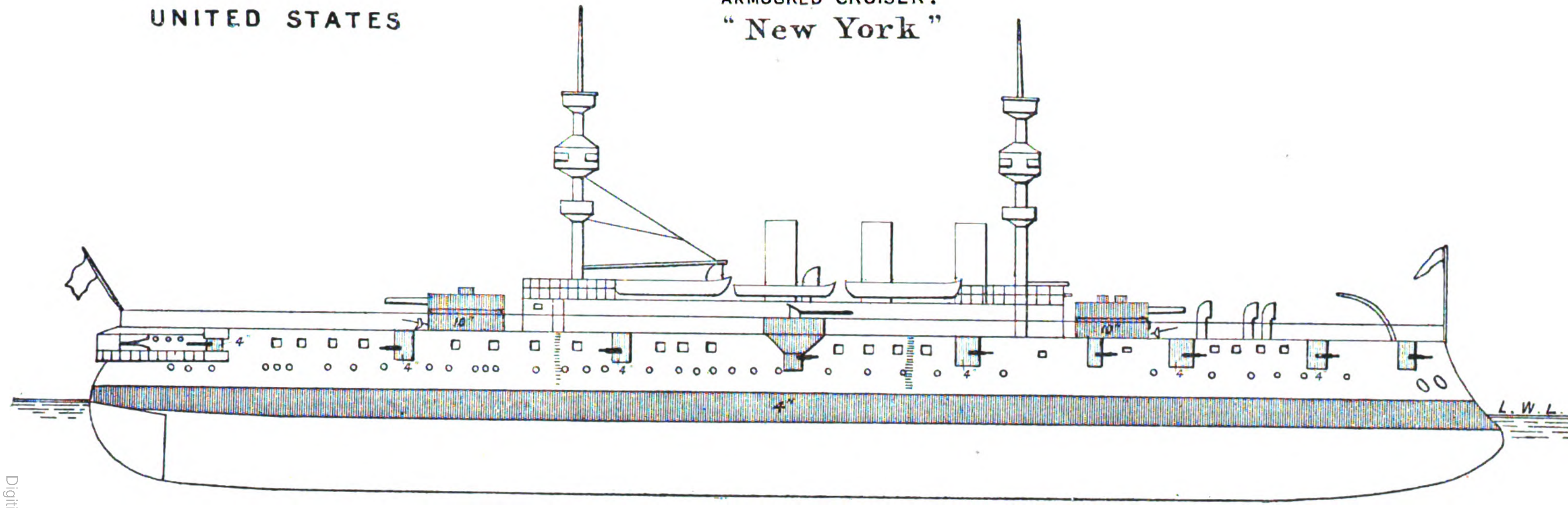


PLATE 84

UNITED STATES

ARMOURED CRUISER.

"New York"



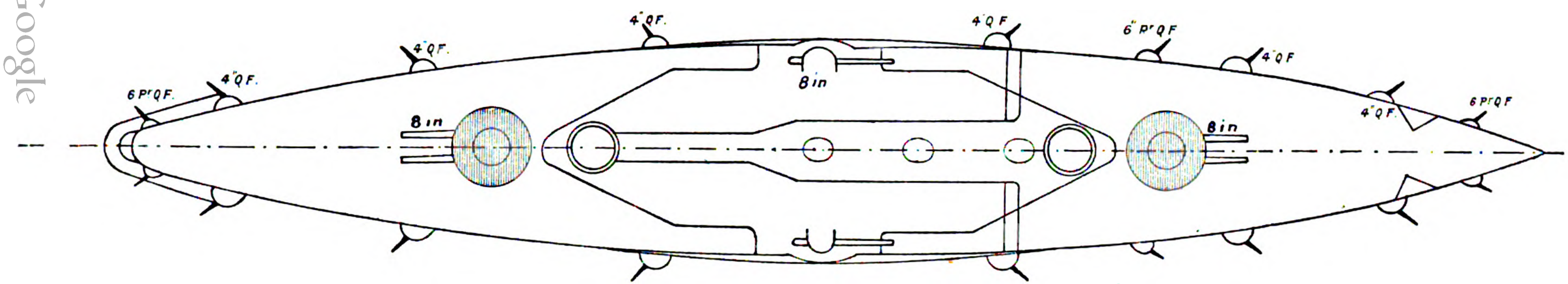
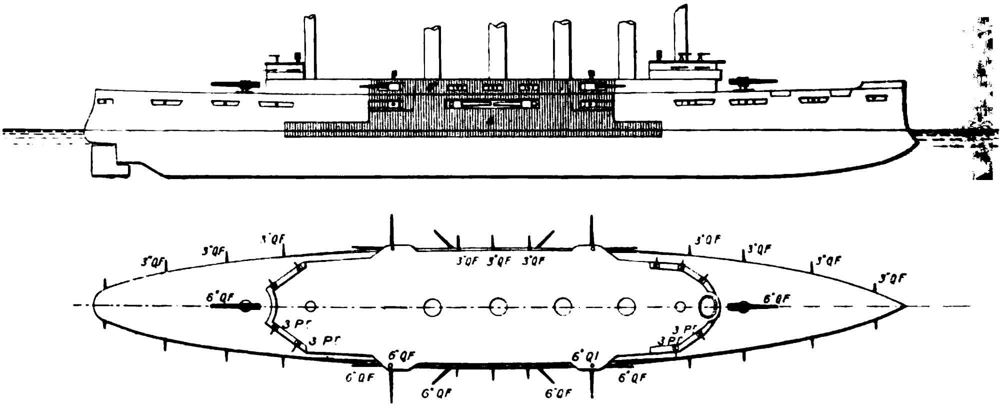
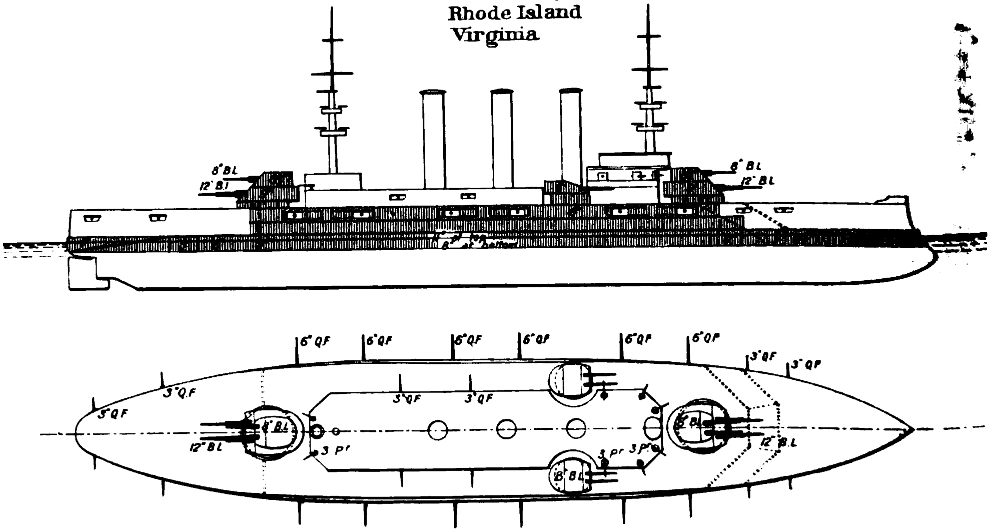


Plate 85.

Charleston.
Milwaukee.
St Louis



Georgia
Nebraska
New Jersey
Rhode Island
Virginia



"Texas" UNITED STATES

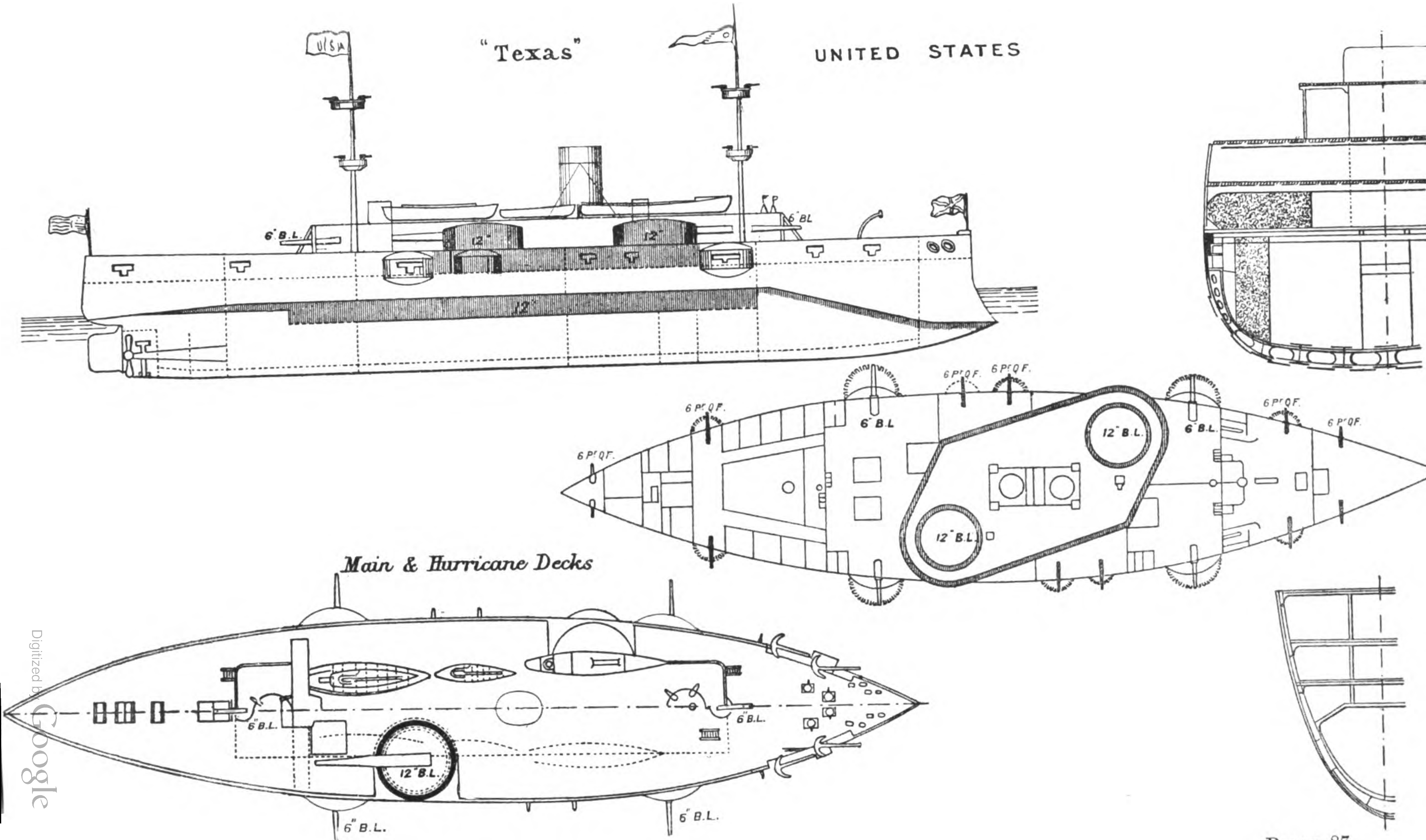


PLATE 87.

UNITED STATES.

SUBMARINE TORPEDO BOAT.

Adder. Moccasin. Porpoise.
Grampus. Pike. Shark.

On Special Scale.

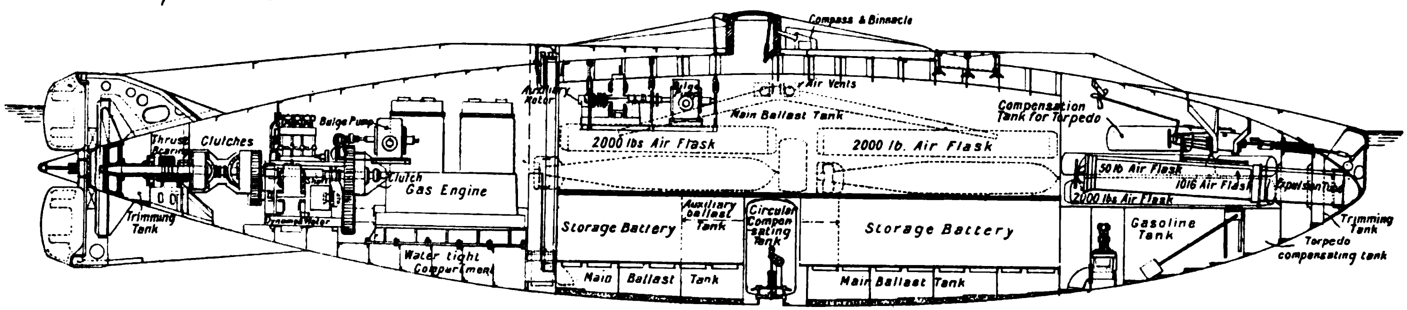


PLATE 88.

PART III.

ARMOUR AND ORDNANCE.

PART III.

Armour and Ordnance.

CHAPTER I.

ARMOUR.

FOR more than a decade the section of the *Naval Annual* devoted to armour and ordnance has been most ably edited by the late Captain Orde Browne, R.A., whose untimely death is a great loss, not only to those who have read with much pleasure from year to year the excellent articles that proceeded from his pen, but also to all who are connected with the manufacture and use of guns, ammunition, and armour plates. And as an insular nation, depending under God on the protection which our Navy affords, where is the man who should not be concerned in the excellence of those means of offence and defence on which the Navy must mainly rely?

Captain Orde Browne added to an excellent judgment and great critical capacity such fairness of mind and absolute integrity, that he was constantly entrusted with information which was withheld from others, who had not his practically world-wide reputation for discretion and fairness. On many occasions he was thus enabled to speak with great authority, and was one of the first to predicate the many and important changes and improvements that have taken place in recent years in the armour and armament of our ships. Patriotic as he was, he never hesitated to point to any evidence that clearly showed that we were dropping behind our rivals abroad in the race for excellence of *matériel;* thus an appreciation of a home product endorsed by him was worth far more than if it had emanated from one who could see nothing good in that which had its origin abroad.

The Editor has determined that, for this year at any rate, the Ordnance Section shall retain its old form; the valuable tables and other data due to Captain Orde Browne are retained, with the few corrections necessary, whilst, according to custom, particulars of some of the most important trials of armour plates are also included.

Immense progress in armour in the last decade.

Although year by year the *Annual* has called attention to the advances made in ordnance *matériel* and armour, it is doubtful whether outside a comparatively narrow circle of experts it is fully realised what a complete revolution has taken place within the last decade — more especially in armour. We propose, therefore, to briefly review the progress made. Nor is this merely an interesting retrospect into past history; it intimately concerns the battleships—the first-class battleships—of the present day. All authorities are agreed in admitting the claims of the Royal Sovereign class to be placed in the category of First-Class Battleships. They still form the backbone of our Mediterranean Fleet. But these ships are protected by compound armour, armed with 13·5-in. guns, have only four quick-firing guns mounted behind armour, and carry no hoods over their barbette guns. The question of the guns will be dealt with later on, but let us first look at the armour.

Compound and ordinary or mild steel armour.

From 1880 to 1890 compound armour reigned supreme in England, whilst abroad compound and steel were used indifferently. Many were the comparative trials that took place between compound and steel armour; but, on the whole, the two systems of amouring gave very similar protection for the same weight, and there was so little to choose between the two that some nations, notably the French, had ships built at the same period, some of which were protected by compound armour and some by steel. When compound armour was first introduced, about the year 1880, the armour-piercing projectiles commonly in use were made of cast iron, chilled by the Palliser or some similar process. The comparatively hard steel face of the compound plate had such resisting power that the inferior metal forming the head of the Palliser projectile was completely crushed up and no deep penetration was effected, unless the energy and piercing power of the projectile was very great as compared with the resistance of the plate; when this happened, though the projectile was crushed, a piece of plate was punched out.

Improvements in projectiles.

About the year 1886 the appearance of chrome steel projectiles, made by Holtzer and other French firms, completely altered the aspect of the case. The material of which these projectiles were made was so superior in combined hardness and toughness to the face metal of the best plates, that complete perforation was effected without deformation of the projectile, and, as a result, the piercing power of guns went up fully 20 per cent. In 1885 a good compound plate 10 inches thick might have been considered equal in resisting power to some 15 or 16 inches of wrought iron; but in 1886 this figure was reduced to 12½ inches of wrought iron, when the plates were attacked by chrome steel shot in lieu of Palliser.

For some five years the projectiles triumphed over the plates, passing through them without deformation, and though the steel and compound armour used was much superior to the wrought iron with which all ships built in the seventies were plated, the plate makers failed to produce a plate which could be counted upon to crush up the hardened points of the chrome steel shell.

The plates once more gain the ascendancy.

But the plate makers did not stand still. In 1890 Captain Orde Browne remarks on some trials that took place the previous year:— "*On Brown's plate the Krupp projectiles broke up like chilled iron.*" In Brassey's *Annual* of 1890 there is also an account of a most extraordinary result said to have been obtained by a plate made in America by the Redemann-Tilford process, when a 6-in. plate defeated a 100 lb. 6-in. projectile, striking with a velocity of 2,103 ft. secs., and having a piercing power of 15 inches of wrought iron. Such an unprecedented trial, in which a 6-in. plate resisted an attack which would have defeated a compound plate nearly 12 inches thick, scarcely aroused so much attention as should have been the case, owing possibly to a certain amount of incredulity. And though this took place before a single plate had been made for the Royal Sovereign, not only that ship herself, but her seven sisters, the latest built of which, the Revenge, was not completed till 1895, were all armoured with compound plates. Nor is there any blame to be imputed to our authorities for their apparent remissness.

Cemented plates establish their superiority.

As a matter of fact, they were extremely alert and took up the new process immediately it was established as a practical success, which success was demonstrated by the repeated production of cemented plates not only hard but tough. But a new process means new manufacturing plant, which takes years before it is in thorough working order and capable of turning out large quantities of plates— so that it must always happen, as occurred in this instance, that though a new process may have been discovered, ships cannot be supplied with better quality plates for some time to come.

The first plates with cemented faces tried in England were manufactured by Sir John Brown & Co., and were made by a process patented by Captain Tresidder; the trials took place in 1891 and are given in the *Annual* for 1892. At the same time, trials of the Harvey process were being carried out at Indian Head, and are given in the same volume. The most satisfactory result was that a 10½-in. Harvey plate just succeeded in stopping an 8-in. Carpenter steel shot weighing 250 lb., the velocity being 1,700 ft. secs., and perforating power 14·8 inches of wrought iron. This plate, therefore, had a figure of merit somewhat above 1·4, and was some 20 per cent. better than the steel and compound plates then

being supplied to the Royal Sovereign and other ships building. About the same period, namely July, 1891, a nickel steel plate of Schneider's, of 10·43 inches, was just pierced by projectiles with perforating power of 13·35 wrought iron. Its figure of merit was 1·28—some 10 per cent. less than that of the Harveyed plate; but it was greatly superior to the compound plates of the Royal Sovereign class. The Tresidder plates were decidedly superior to the Schneider nickel steel, but were not quite equal to the Harveyed plates, and the latter process was adopted by all the great Sheffield firms.

Particulars of trials of Harveyed Schneider nickel steel plates, 1891.

The first ships for which it was decided to adopt the Harvey process were the U.S. ships Brooklyn and Indiana, begun in 1892, completed in 1896. A sample 6-in. plate for the latter had the remarkable figure of merit of 2·25 far eclipsing anything in the way of iron cemented plates, or of any other process hitherto tried. But, although the Americans had a considerable start, owing to the enterprise of our Sheffield firms and the energy with which the work was pushed on in England, the Majestic, though begun some time after the Indiana, was the first ship actually completed which had the great advantage of having Harveyed plates. No trials can be quoted as showing the exact resistance of her plates, but the 6-in. plates may be considered as having a figure of merit equal to those tried on board the Nettle towards the latter part of 1893, when the average figure of merit was about 2·0. The thicker plates may be considered equal to the 10½-in. plates tried at Shoeburyness with a figure of merit of 1·9.

Enormous advantage of Harveyed over compound plates.

The advantage gained by using Harveyed, as compared with compound, plates was enormous. A 10½-in. plate which, if made on the compound system as supplied to the Royal Sovereign, could have been pierced by a 6-in. 6-ton gun, was able to resist successfully a shot from the 9·2-in. 25-ton gun fired under similar conditions. The extra resistance given to the armour would force an opponent to increase the weight of the attacking gun four-fold. Or, if the resistance of the Royal Sovereign's armour be considered adequate, it was possible in the Majestic class to increase the area protected by armour more than 50 per cent. without adding to the weight. A great gulf, therefore, exists between the Royal Sovereign and Majestic classes, and from this point of view it may scarcely be fair, considering the great improvements made since the former were built, to classify them as first-class battleships.

Progress in Foreign Countries.

At the time that the Majestic class were being plated in England, viz. from 1893 to 1897, the French were applying nickel steel (non-Harveyed) armour to the ships coming forward, and the following

ships are all plated with nickel steel, non-cemented, the figure of merit of which is about 1·4:—

	Completed in
Carnot	1897
Jauréguiberry	1897
Charles Martel	1897
Masséna	1898

The Bouvet, completed in the summer of 1898, was the first French ship with cemented armour, but advantage was not taken of the increased resisting power of the armour to reduce its thickness and increase the area protected, so that the belt is a very narrow one, 16 inches thick, and the turrets have the same thickness, which is equivalent in resisting power to that of some 29 inches of wrought iron, a somewhat unnecessary amount of protection at the date it was provided, but useful now in view of the increase of power in heavy guns. In Russia the Petropavlovsk and Poltava, completed in 1897, have Harveyed armour on their turrets, but their belts are not Harveyed; the Rossia, however, finished about the same time, had a 10-in. Harveyed belt. The first German ship to reap the benefit of the cementing process was the Aegir, completed in 1897, and since then all German ships have had either Harveyed or Krupp process plates.

The Krupp process plates.

As early as 1895, when there were not more than half a dozen ships in the world which had benefited by the Harvey process, Krupp came forward with a rival method of cementing or face-hardening plates, which for some time stood unrivalled, and has only recently been equalled by other processes, which are probably generally similar in principle. The Krupp process has been adopted in all countries save in France and Italy, but both in the great French steel works and at Terni they now use cementing processes which produce equally good results; so that from the point of view of the user of the plate it may be said without serious error that the Krupp process has been universally adopted, and that all ships building at the present time are being furnished with Krupp plates.

Like the Harveyed plates, the Krupped plates depend for their efficiency on the intense hardness of the face, which destroys the point and head of an ogival-headed projectile. The Krupped plates also possess extreme toughness, so that their resistance to punching and cracking is extraordinarily great. We give particulars below of a plate exhibited at the Paris Exhibition made at Terni which resisted a blow which would have pierced nearly three times its thickness of wrought iron. It is possible that this was an exceptional result, but

Figure of merit of Krupp plates.

the average figure of merit for Krupp plates may be put somewhat as under:—

Thickness of Plate.	Equivalent to Wrought Iron.	Figure of Merit.
Inches.	Inches.	
4	9	2·25
6	16	2·67
8	20	2·5
10	24	2·4
12	28	2·33

The figure of merit for the thinnest plate, viz., the 4-in., is lower than the others, since hitherto plates of this thickness have not equalled thicker ones in resisting power. The Terni Company, however, exhibited at the Paris Exhibition a 9 cm. (3·54-in.) plate with a figure of merit exceeding 2·5, and a second plate of 11 cm. (4·33-in.) which had the remarkable figure of merit of just over 2·85, as it resisted a 4·7-in. projectile, weight 45 lb., velocity 2,198, penetrating power 12·3 inches wrought iron.

The results already obtained with Krupp plates justify us in considering the resistance of a Krupp plate as being equal to that of a compound plate of double its thickness. Thus the 17-in. barbette plates of the Royal Sovereign might be replaced to-day by 8½-in. Krupp plates, thus saving an immense deal of weight. Our latest battleships, the Duncan class, will have no plates thicker than 11 inches, and so far as we are aware 12 inches is about the thickest armour that is being made; moreover, it is quite possible that the French battleships which are said to be going to receive plates of this thickness may be content with thinner ones.

The gun beaten by the plate.

The fact that the plates are being reduced in thickness shows that on all hands it is considered that the plate has completely beaten the gun. Nor is this remarkable, for the plate has an immense advantage over the gun which is not generally understood or appreciated. The fact is that the addition of weight to the plate in order to obtain increased resisting power is as nothing to the corresponding increase in weight of the gun made necessary in order to cope with a plate of increased thickness. At present a 12-in. gun of 50 tons fairly matches a 12-in. plate. If the plate were doubled in thickness—and the Inflexible actually carries 24-in. plates—the gun would have to be increased in weight to 400 tons, whilst a

single projectile would weigh nearly 3 tons. Such a gun is, of course, out of the question.

Resisting power of armour of first-class battle-ships.

The following table shows the resisting power of the plates of typical first class battleships:—

TABLE I.

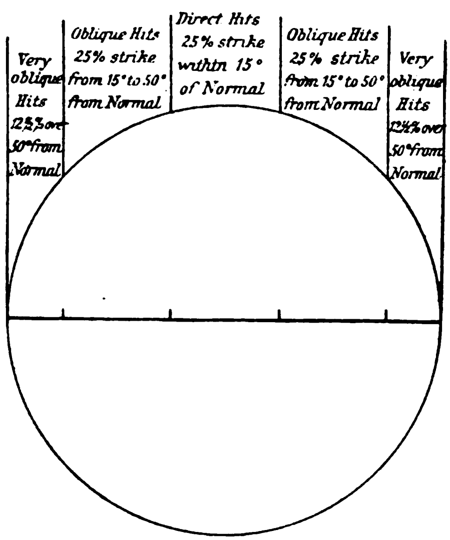
ARMOUR OF TYPICAL FIRST-CLASS BATTLESHIPS.

SHIP.	Date of Completion.	Actual thickness of Armour.			Resisting power of Armour.			Remarks.
		Belt.	Heavy Gun Protection.	Q.F. Gun Protection.	Belt.	Heavy Gun Protection.	Q.F. Gun Protection.	
		Inches.	Inches.	Inches.	Inches, wrought iron.	Inches, wrought iron.	Inches, wrought iron.	
Inflexible	1881	24 w.i.	17 c.	Nil.	24	21	Nil.	w.i. = wrought iron
Formidable (French)	1885	21½ s.	16 s.	Nil.	26	20	Nil.	s. = steel.
Royal Sovereign	1892	18 c.	17 c.	6 c.	22½	21½	7½	c. = compound.
Brennus	1894	18 s.	18 s.	4 s.	22½	22½	5	n.s. = nickel steel.
Charles Martel	1897	18 n.s.	14½ n.s.	4 s.	24	19	5	h.s. = Harveyed steel.
Indiana	1896	18 h.s.	17 h.s.	6 h.s.	29	27	13	k.s. = Krupp steel.
Majestic	1895	9 + 4 h.s.	14 h.s.	6 h.s.	27*	24½	12	
Three Saints	1896	16 h.s.	16 h.s.	5 s.	26	26	6½	
Bouvet	1898	16 h.s.	16 h.s.	5 s.	29	29	6½	
Sevastopol	1899	14½ h.s.	14 h.s.	5 s.	28	27	6½	
Implacable	1901	12 k.s.	12 k.s.	6 k.s.	28	28	15	
New Designs— England, France, America	1904?	11 k.s.	11 k.s.	6 to 7 k.s.	27	27	16 to 18	

* Resistance of sloping deck included.

Chances of hitting direct or otherwise.

From the above it appears that whereas ten years ago the standard resistance sought for in the thick armour was from 22 to 26 inches wrought iron, it has now slightly increased and stands at 27 to 28 inches. Theoretically, this scarcely seems sufficient, for the 13·5-in. guns of the Royal Sovereign or 14·5-in. of the Formidable pierce some 25 inches wrought iron at 3,000 yards, and the 12-in. guns of the Implacable or Bouvet pierce 29 inches at the same range. But this assumes that the projectile strikes direct, which only about one in four will do when the target is a circular turret.



The following table is made out for a circular turret, but it may be applied without much error to the case of belt armour, for it seems probable that ships will usually engage broadside to broadside in order to bring the greatest number of guns to bear, and therefore under ordinary circumstances at least 60 per cent. of the rounds fired will strike within 37° of the normal whether the target be a curved turret or a wall-sided battery.

Extra piercing power required when hitting obliquely

TABLE II.

TABLE SHOWING EXCESS OF PIERCING POWER TO OBTAIN PERFORATION ON OBLIQUE IMPACT ON CIRCULAR TURRET IF NORMAL RESISTANCE = 100.

Piercing power.	Angle with normal at which perforation is obtained.	Percentage of Hits striking within this angle.
104	15°	25
110	20°	34
120	25°	43
130	30°	50
140	34°	56
150	37°	60
175	45°	70
200	53°	78

Example of proportion of piercing hits.

Let us suppose an engagement between the Royal Sovereign and the Brennus, the Implacable and the Bouvet, the piercing power of their guns being as under :—

TABLE III.

Ship.	Gun.	Piercing power in Wrought Iron at ranges as under.			
		1,000 yds.	2,000 yds.	3,000 yds.	4,000 yds.
	Inches.				
Royal Sovereign . . .	13·5	30½	27½	25	23
Brennus	13·4	36	32	29	26
Implacable	12 IX.	35½	32	29	26
Bouvet	12	33	29	26	24½

The resistance of the Royal Sovereign's barbette is equal to 21½ inches, and that of the Brennus' turrets 22½ inches wrought iron.

Then we see that the percentage of piercing hits out of the total number striking the target is as under :—

TABLE IV.

Target.	Piercing Hits per cent.			
	1,000 yds.	2,000 yds.	3,000 yds.	4,000 yds.
Royal Sovereign (barbette) fired at by Brennus . .	66	59	53	44
Brennus (turret) fired at by Royal Sovereign . . .	53	44	35	15

At 3,000 yards about half the armour-piercing shot striking the Royal Sovereign's barbette will do no harm, whilst two-thirds of her hits on the Brennus' turrets will be equally harmless. At 4,000 yards the Brennus gets in nearly three times the number of piercing hits obtained by her opponent. But even at 3,000 yards it will be good practice if 10 per cent. of the rounds fired strike the barbette or turret at which they are aimed, so that at this range the Brennus would have to fire nineteen rounds before getting a piercing hit, and the Royal Sovereign twenty-nine, whilst at 4,000 yards the numbers would be thirty-eight and one hundred and ten. At 2,000 yards, however, where the hits should be one in five, the Brennus would only have to fire eight rounds and the Royal Sovereign ten. In the above case the guns most decidedly overmatch the armour; but in a duel between the Bouvet and Implacable the figures would be for every 100 shot striking the target :—

TABLE V.

Target.	Piercing Hits per cent.			
	1,000 yds.	2,000 yds.	3,000 yds.	4,000 yds.
Implacable (barbette) fired at by Bouvet .	40	20	Nil.	Nil.
Bouvet (turret) fired at by Implacable . .	45	30	15	Nil.

Here, at 3,000 yards, the Implacable's barbette is impenetrable, and some six hits out of seven would fail to pierce the Bouvet's turret; or, assuming as before that one-tenth of the rounds fired hit the turret, it would take sixty-seven rounds to disable it, far more

than the number of armour-piercing shot carried. If the ships closed to 2,000 yards one shot in five might hit turret or barbette, therefore at this range seventeen rounds from the Implacable should give one piercing hit, whilst the Bouvet would require to fire twenty-five.

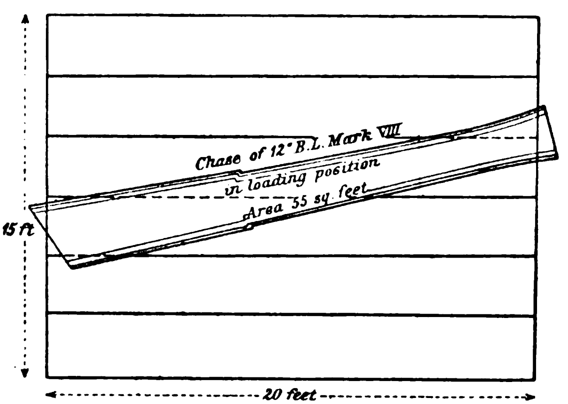
Should heavy guns fire armour piercers or common shell?

It is often objected that it would be out of the question to devote the services of a heavy gun for perhaps half an hour (25 rounds per half-hour is a good record for a single gun) to silencing an opposing gun protected by turret or barbette. Shot ought not to be fired, say these objectors; shell should be resorted to. But if a heavy gun takes to firing shell, it at once puts itself into competition with the quick-firing guns, which are infinitely superior for this purpose. For example, a 12-in. gun fires in one minute one 850-lb. shell with bursting charge 80 lb. Eight 6-in. guns weigh about the same as one 12-in.; they can fire in one minute shells aggregating 3,200 lb. with some 300 lb. of bursting charge. Moreover, the 6-in. shells will hit the enemy in thirty-two places, the 12-in. shell in only one. Nor is it in the least clear how even a 12-in. shell bursting outside the armour is going to damage anyone or anything inside. All trials have shown that shells breaking up on the face of armour plates which they are too weak to pierce do no harm. It is perfectly evident from the fact that the battleships of all nations carry nothing between the heaviest quick-firing gun and the lightest big gun capable of piercing their opponent's thick armour, that the *rôle* of the heavy gun is essentially armour-piercing, and that all nations intend to use quick-firing guns for shell fire, heavy guns for attacking armour.

There are, of course, many heavy guns mounted which can be more readily silenced by shot or even shell from quick-firing guns than by the comparatively slow process of pounding at the armour with heavy shot, but this is due to errors which will not be repeated in new ships. The guns of the Majestic and Royal Sovereign classes are unfortunate cases in point. These guns are loaded fore and aft, but the end-on fire of the ships is so weak, and the broadside fire so strong, that they must needs bring an enemy to bear on the beam or nearly so. This exposes the chase of the gun when loading, and in the case of the 13·5-in. much of the breech as well, broadside on to the enemy's fire. A gun end on to the enemy's fire runs little or no risk; the target is extremely small and extremely invulnerable. Many guns have been hit in this position without being put out of action. But broadside on the target is very large (see sketch), and even a 4-in. shell will disable a 12-in. gun striking it in this position. As the target afforded by a 12-in. gun in the

loading position is more than one-sixth the size of the prize-firing target, which at 1,500 yards is hit six times in five minutes by a single 6-in. Q.F. and about twice as often by a 4-in. Q.F., one 6-in. gun firing for five minutes, or one 4-in. firing for two and a half minutes, could, at 1,500 yards, disable a 12-in. gun in the Majestic class, supposing the latter was always in the loading position. If half the time was spent in the loading position the periods would be: 6-in. gun ten minutes, 4-in. gun five minutes. The Royal Sovereign would be worse off, as the target is larger, and the time spent in the loading position relatively longer. Of course all this is at the comparatively short range of 1,500 yards. Still at 3,000 yards a single 6-in. gun should not take more than half an hour to disable a 12-in. gun loading from a fore and aft fixed position, and a quarter of an hour

Chance of disabling heavy gun without piercing armour.



Prize Firing Target 20 ft x 15 ft is hit by 6 inch QF 6 times in 5 minutes Range 1500 yards: Area 300 square feet.

should suffice for the 13·5-in. of the Royal Sovereign class. A modern armoured cruiser, say the Japanese Asama, would make exceedingly short work of the Royal Sovereign. The only guns in the battleship which can silence the Asama's four 8-in. and ten 6-in. Q.F. guns, all protected by 6 inches of Harveyed steel, are the 13·5-in. guns, and these, as shown above, would be quickly silenced if, say three 6-in. Q.F. were devoted to the task, all firing at the barbette which happened to be loading. The Asama, having the speed, would close in to 2,000 yards or so, where the three quick-firers would finish their work in three or four minutes. Even at 4,000 yards both 13·5-in. barbettes ought to be out of action in a quarter of an hour or twenty minutes. In the meantime the Asama's four 8-in. Q.F. and

Royal Sovereign v. Asama.

the remaining two protected 6-in. Q.F. would, with the two unprotected 6-in. Q.F., make short work of the five 6-in. Q.F. on the Royal Sovereign's broadside, only two of which are protected, and that by but 6 inches of compound armour, which would be riddled with great ease by armour-piercing shell from the 8-in. guns or by shot from the Asama's 6-in., which are themselves protected by armour impenetrable to the 6-in. shot of the Royal Sovereign. Once the Royal Sovereign's guns were silenced, the threat of a torpedo must bring her flag down. A far smaller ship than the Asama, such as the Italian Varese, of 7,400 tons, would indeed suffice to capture the Royal Sovereign; all that is needed is ten or a dozen 6-in. Q.F. protected by 5 inches of Krupp steel, and with water-line similarly protected. The only remedy for the Royal Sovereign appears to be to give her new barbettes with 11-in. Krupp armour and 12-in. IX. guns, the weight saved being put into 6-in. Krupp armour for the protection of six 7·5-in. guns to take the place of the six 6-in. Q.F. on the upper deck. But is the ship worth it, looking at her inferior speed? If the answer is No, the alternative is to build eight new battleships to replace the Royal Sovereign and her seven sisters. Such ships as these latter, which, owing to improvements in armour, cannot face modern ships of half their size, and which, owing to their 15 knot speed, must act as a serious drag on a fleet of Russells, Formidables, or Oceans, all good for 17½ knots, should not be retained in our list of first-class battleships.

Dangers of the Royal Sovereign class.

TABLE VI.

PIERCING POWER IN WROUGHT IRON OF TYPICAL Q.F. GUNS NOW AFLOAT IN BATTLESHIPS.

Guns.	Piercing Power.—Wrought Iron.			
	1,000 Yards.	2,000 Yards.	3,000 Yards.	4,000 Yards.
	Inches.	Inches.	Inches.	Inches.
6-in. VII.	17	14	11	9
6·46 French	16	13	10	8
5·46 French	14	11	8	6
6-in. Q.F.	13	10	8	6
5·46 French earlier patterns	10	7	5	4

Looking back at Table I. it is apparent that since the adoption of cemented plates the protection of the heavy quick-firing guns

used as the secondary armament has been enormously increased. For the last twelve years British and American ships have taken the lead in this important matter, so that whilst nearly all ships built on the Continent had only such armour for the protection of their secondary armament as could easily be penetrated by the quick-firing guns carried by their rivals, British ships were being furnished with casemate armour well nigh or quite impenetrable except by the heavy guns.

Armour for the protection of secondary armaments.

In her day the Royal Sovereign's casemate armour, with resistance equal to 7½ inches wrought iron, was absolutely impenetrable by the old pattern 5·46 gun at 2,000 yards, but her 6-in. Q.F. would even at 4,000 yards (see Table II.) send 43 per cent. of the shot which hit through the Charlemagne's turrets (equal to 5 inches wrought iron), and at 2,000 yards 78 per cent. The improvement of the 5·46 gun and the adoption of the 6·46 has made the Royal Sovereign's armour penetrable at 3,000 and 4,000 yards respectively; but the Majestic's casemates (equal to 12 inches wrought iron) are perfectly safe from the 5·46 at 2,000 yards, and only some 30 per cent. of the 6·46 hits pierce at the same moderate range.

In the case of all new ships with 6-in. Krupp armour, equal to from 15 to 18 inches of wrought iron and quite impenetrable to our best 6-in. at quite short ranges, such as 1,500 yards, it is evident that more powerful guns are required, having a penetration of from 18 to 20 inches of wrought iron at 2,000 yards. Even if 3,000 ft. secs. muzzle velocity could be attained *with a service charge* from the 6-in. as has been promised by some sanguine prophets, this would not suffice, and a more powerful gun is an absolute necessity.

The Americans claim the following velocities and energies from their latest guns, which correspond to penetrations as under:—

Power of latest Q.F. guns.

TABLE VII.

Gun.	Muzzle Velocity.	Weight of Projectile.	Muzzle Energy.	Penetration.							
				1,000 Yds.		2,000 Yds.		3,000 Yds.		4,000 Yds.	
				W. I.	K. S.	W. I.	K. S.	W. I.	K. S.	W. I.	K. S.
	f. s.	lbs.	ft. tons.								
6-in. Q.F. . .	2,900	100	5,838	19	7	16	6	13	5	10	4
8-in. Q.F. . .	2,800	250	13,602	27	11	23	9	20	8	17	6½

But the 8-in. is not a quick-firer. The British 7·5-in., with a rate of fire of four rounds per minute, has the following power, which fairly meets the case, a cordite charge being used:—

TABLE VIII.

Gun.	Muzzle Velocity.	Weight of Projectile.	Muzzle Energy.	Penetration.							
				1,000 Yds.		2,000 Yds.		3,000 Yds.		4,000 Yds.	
				W. I.	K. S.	W. I.	K. S.	W. I.	K. S.	W. I.	K. S
	f. s.	lbs.	ft. tons.								
7·5-in. Q.F. of 14 tons.	2,600	200	9,388	22	8½	19	7	16	6	13	5

With such a powder as that used in America, which gives a higher velocity than cordite, a 6-in. Krupp plate would be pierced at 3,000 yards by some 40 per cent. of the shot striking, and this should be sufficient; but nothing less than a 14-ton gun will at all meet the case, and it almost looks as if the old duel between guns and plates is to be repeated with quick-firers, and we may soon see 9·2-in. quick-firers pitted against 9-in. plates.

Recent trials of armour plates.

There is nothing very remarkable to record this year in connection with armour plate trials. Plates treated by the Krupp and similar processes have attained such a degree of excellence that it is difficult to see how they can improve. Still there is no doubt that the plates exhibited by the Terni Company at the Paris Exhibition, if not an improvement on what has hitherto been obtained, were extremely good, and we therefore give the results of trials of two of them.

5·9-in. Terni special plate.

"Terni Special" plate: 7·9 ft. by 5·25 ft. by 5·9 in., tried at Muggiano (Spezia), 23rd May, 1899. Gun 6-in.; projectile, Krupp armour-piercing shot, weight 100 lbs.

Round.	Striking Velocity.	Effect on Plate.	By Tressider's Formula.	
			Penetration. Wrought Iron.	Figure of Merit.
	f. s.			
1	1,936	Projectile broke up on the face of the plate. Greatest penetration 4·3 inches. No cracks	13·2	2·26
2	,,		,,	,,
3	,,		,,	,,
4	,,		,,	,,
5	,,		,,	,,
6	2,313	Plate just pierced, the point of the projectile remained in the backing without injuring the inner skin. No cracks .	17·2	2·92

The first five rounds are evidently of a similar character to the standard rounds fired for the test of plates at Whale Island, and it was only to be expected that the plate would defeat with ease projectiles capable of piercing a wrought-iron plate two and a quarter times its thickness. But the sixth round is a very severe test; it struck comparatively close to the edge and to the points of impact of three other rounds. Nevertheless, it was stopped by the backing, and did no material harm, so that this plate attains the very remarkable figure of merit of 2·92, which has scarcely been exceeded anywhere.

The next plate to which we would call attention is also a Terni plate, but only 4·3 inches (11 cm.) in thickness. Plates of this thickness are of great interest at the present time, as they are being supplied to the smaller type of armoured cruisers, such as our "Essex" class, and until recently it was an exceedingly moot point if the cementing process could be applied with advantage to such thin plates. It would have been more interesting if, in addition to the rounds fired by the 4·7-in., a round had also been fired from the 6-in. gun at the Terni plate. Our own 6-in. Q.F. has only a penetrating power of 10 inches of wrought iron at 2,000 yards, and this is the sort of blow that a 4-in. or 4½-in. plate is likely to get on service. Other Terni special plates.

"Terni Special" plate: 6·5 ft. by 5·25 ft. by 4·3 in., tried at Muggiano (Spezia), 20th February, 1900. Gun 4·7-in.; projectile, Terni armour piercing; weight 45 lb.

Round.	Striking Velocity.	Effect on Plate.	By Treeidder's Formula. Penetration. Wrought Iron.	By Treeidder's Formula. Figure of Merit.
	f. s.			
1	1,887	Penetration 2·75 ins. Point of projectile left in plate	9 5	2 2
2	"	Penetration 2·64 ins. Projectile broken as before	"	"
3	"	Projectile broken. Penetration not measured	"	"
4	2,116	Projectile broken. Penetration not measured	11·3	2·62
5	2,198	Projectile broken. Penetration not measured. Bulge at back, 2·4 ins. high, 3 radial cracks	12·0	2·77

There were no cracks. The resistance to the last round was most remarkable. A figure of merit of 2·77 is excellent for a 6-in. plate, but for a plate as thin as 4·3 inches it is, so far as we are aware, quite unprecedented, and the Terni works may be congratulated at obtaining such a very good result, more especially since their

experience as manufacturers of armour plates is not very extensive. The Terni firm also exhibited a 3·54-in. plate, which was just matched by a 12-pdr. shot with piercing power of 9-in. wrought iron, giving the excellent figure of merit of 2·55, and a 3-in. plate which was only just pierced by a 12·2-lb. shot, velocity = 2,306 ft. sec., piercing power 8·4 ins., figure of merit 2·8 nearly (see Fig. 1).

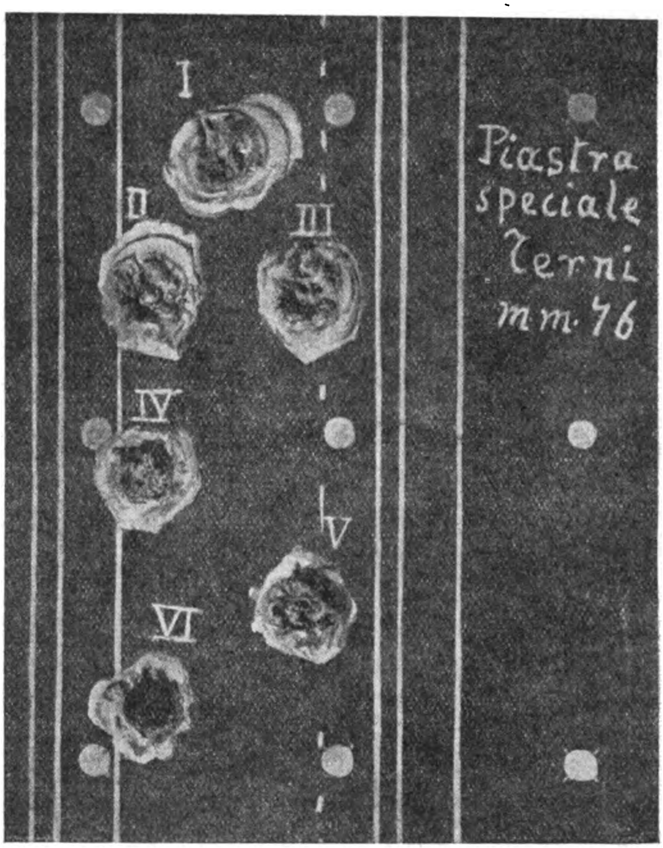


FIG. 1.—TERNI 3-IN. PLATE WITH FIGURE OF MERIT 2·8 (NEARLY).

Non-cemented plate.

One of the last articles written by Captain Orde Browne (see *Engineer*, August 3rd, 1900) described the trial of a 4-in. K.N.C. (Krupp non-cemented) plate made by Messrs. Cammell and Co., when a 4-in. plate completely defeated a 4·7-in. shot with velocity of 1,813 ft. sec. and penetrating power 9 inches, the corresponding figure of merit being 2·25. The British plate was not tested up to its limit of resistance, so there is no evidence whether it was or was not up to the very high standard of the Italian plates; but we have had

no published results of trials of 4-in. plates in England where the figure of merit rises above 2·25, and 2·2 has generally been considered a good figure for plates of this thickness.

But even with a figure of merit of 2·5 or 2·7, a 4-in. plate is not a sufficient safeguard against 6-in. projectiles from the most recent guns, for at 3,000 yards such a plate can be perforated by the 6-in. VII. gun; from 25 to 35 per cent. of the hits piercing, whilst at 2,000 yards 50 per cent. would perforate.

Caps for armour-piercing projectiles.

But little progress has been made this year with caps for armour-piercing projectiles. There is no doubt that when the cap acts it is most efficacious, increasing the piercing power from 10 to 15 or even 20 per cent.; but it does not always act with direct fire, and does not act at all with oblique fire beyond, say, 20° from the normal. Still a cap may be very useful when a gun is barely up to piercing a plate. Take, for example, the case of a French 5·46 gun trying at 2,000 yards to silence a 6-in. Q.F., in one of the Majestic's casemates, with protection equal to 12 inches wrought iron, whilst the 5·46 is only good for 11 inches. The French ship might not like to close in to 1,500 yards for fear of torpedoes, but the use of capped shot would cause most of the projectiles striking within 20° of the normal to penetrate; these would amount to (see Table II.) some 30 per cent. of all the hits on the casemates. On the other hand, if the gun had sufficient power to penetrate 13 inches without a cap, which it would have at 1,300 yards, some 30 per cent. would pierce in any case. And the use of a cap would not increase this percentage at the short range, for it would not assist these rounds that struck at more than 20° to the normal. Or let us consider the case of the 12-in. Mark IX. gun attacking one of the Bouvet's turrets, which has a resistance equal to 29 inches wrought iron. We get the following results:—

12-IN. B.L. MARK IX. *v.* TURRET OF BOUVET, 16-IN. HARVEYED STEEL.

PERCENTAGE OF PIERCING HITS AT RANGES AS UNDER.

	1,000 yds.	1,500 yds.	2,000 yds.	2,500 yds.	3,000 yds.	3,500 yds.	4,000 yds.	4,500 yds.
Uncapped shot .	45	39	32	26	15	Nil.	Nil.	Nil.
Capped shot . .	45	39	36	32	30	25	25	Nil.

The same proportion of piercing hits can be obtained with the cap at 4,000 yards as without it at 2,500, in each case some 25 per cent. of the shot which strike the turret will pierce; the remainder will fail. But it may not be considered desirable to fire shot at all

at 4,000 yards, because the chance of hitting a small object like a turret is but slight. Say that eleven rounds out of twelve miss the turret, then forty-eight will have to be fired for one piercing hit. Some one or two of the rounds missing the turret might, however,

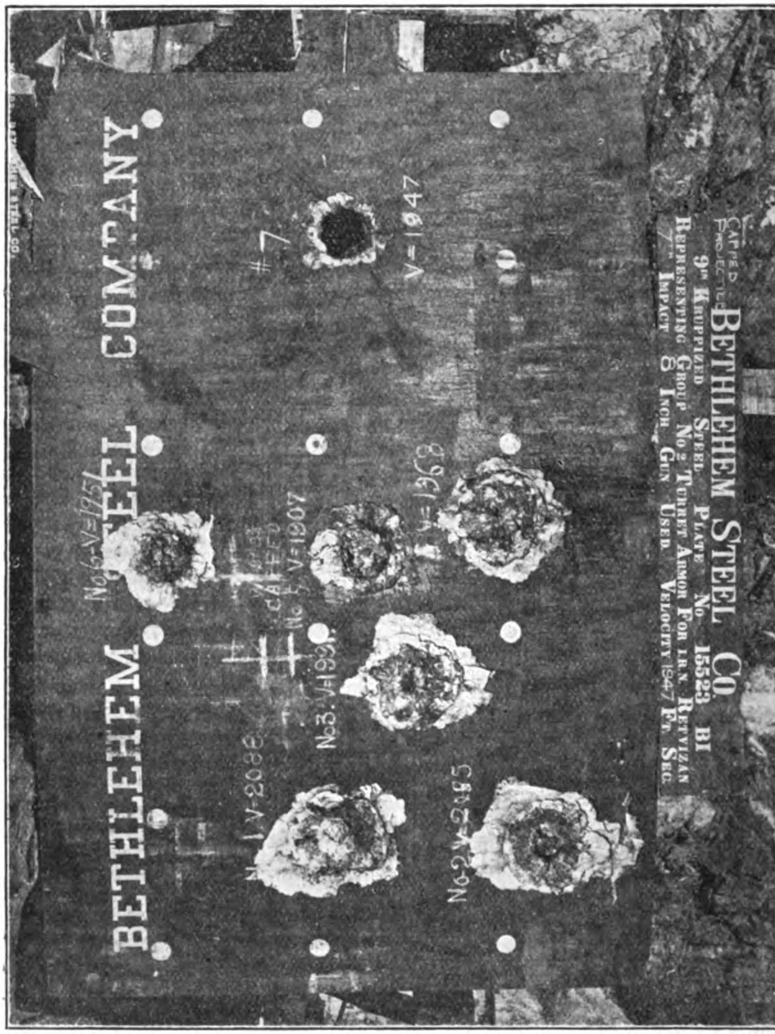


FIG. 2.—BETHLEHEM KRUPP PLATE FOR RETVIZAN ATTACKED BY CAPPED AND UNCAPPED SHOT.

land on the belt or on one of the secondary turrets; the latter would be destroyed and the former pierced. If shell were used in lieu, the chance of piercing belt or large turret would be surrendered, a small turret might equally be wrecked, but there would be somewhat more effect where there is no armour to balance against the chance of a piercing hit. The guns mounted without armour in the Bouvet

are eight 4-in. Q.F., four firing on each broadside; it can scarcely be contended that it is desirable to fire shell from four 12-in. guns in the hope of disabling four 4-in. guns. Above the water-line a 12-in. shell will smash in the upper (4-in.) belt, but a shot would do the same.

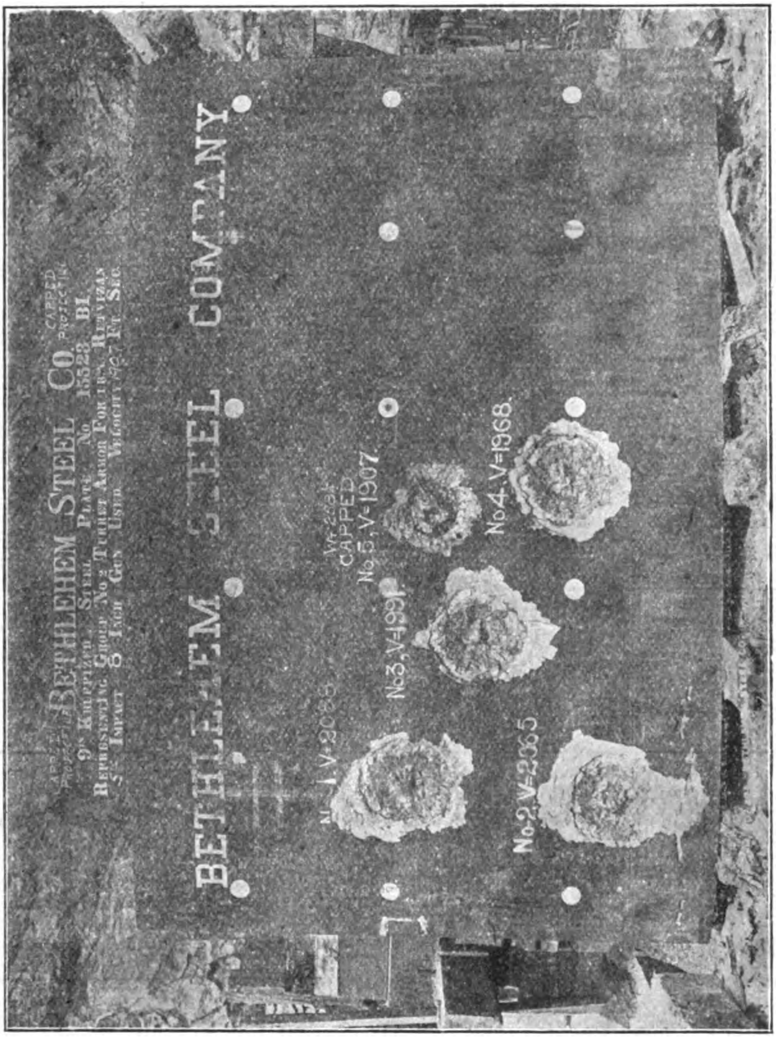


Fig. 3.—Bethlehem Krupp Plate for Retvizan Attacked by Capped and Uncapped Shot.

Therefore the 4-in. guns can well be left to the 6-in. and 12-pdrs., and the 12-in. would profit by having capped shot supplied, so as to be capable of piercing the turrets and silencing the heavy guns of an opponent at as long a range as possible.

Caps are certainly being issued in America, France, and Russia, but it is not known whether they have been adopted in Germany or

Capped shot used at trials of plate for the Retvizan.

Italy. It is, however, a notable fact that all supplies of armour plates are tested by firing uncapped projectiles. The photographs reproduced (see figs. 2 and 3) are principally interesting as showing the advantage gained by using a cap when attacking a Krupp plate direct. The plate, though nominally 9 inches, was actually 9·3 inches thick. It was the proof plate for the acceptance of the turret armour of the Retvizan. It was first subjected to four rounds from the 8-in. gun. For the seventh round a so-called "decapping device" was placed in front of the plate. This consisted of an ordinary thin plate about $\frac{3}{8}$-in. thick, backed by 4 inches of wood. Whether it actually assisted the projectile cannot be stated with certainty, for capped projectiles often give capricious results, but there is no doubt that the sixth round, which had the same velocity, was easily stopped, whilst the seventh went clean through. Whether or no the perforation was due to the cap, the decapping device, or both combined, the photograph shows clearly enough that the projectile held together and was but little deformed, and thus easily tore its way through. On the other hand, the first four projectiles were all mushroomed out to nearly twice their original diameter, whilst the fifth and sixth were also set up and broken, but to nothing like the extent of the first four.

9·3-INCH BETHLEHEM KRUPP PLATE FOR THE TURRET OF RETVIZAN.

Round.	Weight of Shot.	Striking Velocity.	By Tresidder's Formula. Penetration. Wrought Iron.	Figure of Merit.	Effect on Plate and Shot.
		ft. sec.	inches.		
1	252½	2,088	20·3	2·17	Projectile crushed, penetration small.
2	,,	2,065	20·0	2·14	
3	,,	1,991	19·0	2·04	
4	,,	1,968	18·6	2·0	
5	258½ with cap.	1,907	17·9	1·93	Projectile held together fairly, penetration evidently more than previous rounds.
6	,,	1,951	18·6	2·0	
7	,,	1,947	18·6	2·0	Complete perforation.

An alternative proposal to protecting the points of armour-piercing projectiles with caps is to make the shot flat-headed. If the plate attacked is hard enough to crush the point of the shot, the destruction of the whole projectile is easily attained, and the only chance the projectile then has is to punch out a piece of plate at least equal in diameter to the crushed-up shot. But if from the first it is decided to attempt punching rather than piercing, there is no doubt that a flat head must be superior to a pointed one. This was

established by some trials which recently took place with a 6-in. gun against a modern Krupp process plate 7 inches in thickness. Two flat-headed projectiles, with energy sufficient for piercing some 14 inches wrought iron, penetrated to a depth of 6 inches each, whilst a third, with energy corresponding to a penetration of 16 inches of wrought iron, went through easily. Thus a plate which against pointed projectiles might have been expected to show a figure of merit of 2·65, had considerably less than 2·3 when attacked by flat-heads. Question of blunt heads *v.* sharp points for piercing hardened plates.

The objection to flat-heads is that they are decidedly inferior to pointed projectiles when attacking non-cemented plates, but as ships with non-cemented plates are already in a minority amongst first-class ships, the adoption of either caps or flat-heads seems to be most desirable. Caps if equally efficacious, as seems to be the case, have one most important advantage, that they can be applied to existing projectiles, whereas the adoption of flat-headed projectiles would entail the condemnation of a most costly stock of pointed armour-piercers.

Summary and Conclusion.

No great advance has taken place in the manufacture of either plates or projectiles in 1900; the cementing process is now applied to all thicknesses of plates down to 4 inches with great success. If the toughening processes initiated by Krupp are not in universal use, similar results are at any rate obtained in nearly all armour factories, and the production of excellent plates is proceeding at a great rate all the world over.* Hitherto the very best projectiles have entirely failed to tear a clean hole in plates as now produced. In all cases the point of an uncapped shot is crushed. Caps have been used with some success to prevent the utter destruction of the shot on striking, but their action is uncertain, and they fail when striking obliquely. General conclusion as to plates and projectiles in 1900.

The improvements in the quality of armour allow a given weight to be spread over a wider area, and the protection of the quick-firing guns is now very efficient, and water-line armour has been much extended. The modern ship should require a great deal of hammering to bring her to terms, and seeing that the improvement of torpedoes conduces to long range fire, a large amount of ammunition, especially of armour-piercing projectiles, will be needed.

* Three 4-inch non-cemented plates, manufactured by Sir W. G. Armstrong, Whitworth & Co. at their Openshaw works, were tested at Whale Island in April, 1901, these being the first plates of the class submitted by this firm. The gun was the 4·7-in. with 45 lb. armour-piercing projectiles, striking velocity about 1,635 f.s. Three shots were fired at each plate. The *maximum* penetration was just over 1 inch, and, when the plates were taken down, there was no appearance of any bulge or cracks on the backs, and as far as the appearance of the backs was concerned, it was impossible to tell that they had ever been fired at. All the projectiles were shattered by the impact on the surface of the plates. Previous trials of 6-inch plates made by the same firm had given excellent results.

CHAPTER II.

Shell Fire.

The Belleisle Experiments.

During the early summer of 1900 it was announced that the Admiralty had determined to carry out certain experiments, using the old Belleisle as a target ship for various kinds of shell, the experiments having special reference to the risk of fire entailed on ships going into action without removing the multitudinous wood fittings with which every ship built before 1895, and most of those built since, have been only too liberally provided.

The account which follows is mainly taken from the pages of the *Engineer,* whose representative seems to have obtained a fuller history of what happened than most of the other representatives of the press. In some instances, however, information has been culled from other public prints, especially from the *Times,* and where two or more independent accounts agree in traversing the narrative as given in the *Engineer* or *Times,* these independent accounts have been followed.

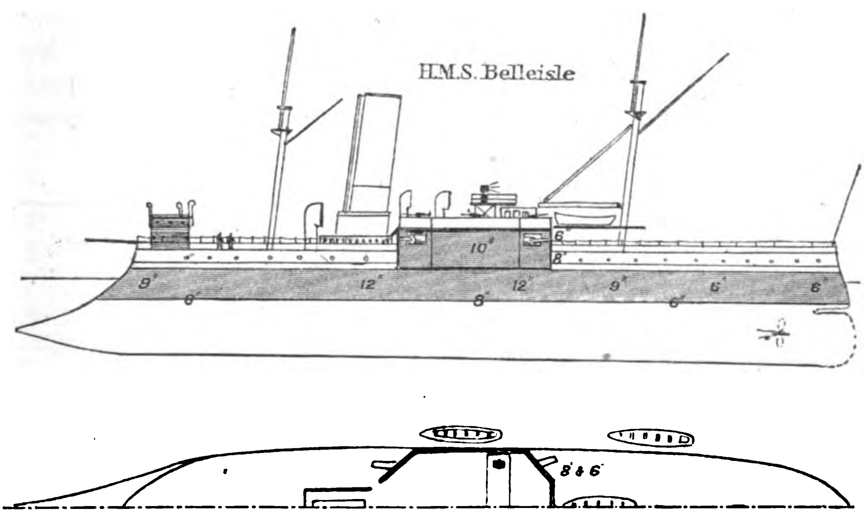
The general aspect of the Belleisle can be gathered from the sketches and photographs. She had a complete belt, with an armoured battery amidships, the armour (wrought iron) varying in thickness from 6 to 12 inches. The deck in line with the top of the belt had from 3 inches to 1 inch of armour. That covering in the battery was 1 inch thick. She carried four 12-inch R.M.L. guns in the battery, and six 6-pdr. quick-firers, and six machine guns on the top of battery.

Conditions of the experiments.

The Belleisle was moored head and stern with some three or four feet of water under her bottom, and was attacked by the Majestic, which steamed in an elliptical course round the doomed ship. Fire was opened from the starboard broadside when the Majestic was right astern of the Belleisle and 1,700 yards off. From this position she gradually closed until she passed the port beam of the Belleisle at 1,300 yards and was about 1,700 yards off on the port bow of the Belleisle, when fire ceased after a period variously reported as being

from six to eight minutes. The speed of the Majestic was about ten knots. The Majestic fired, as far as can be ascertained—eight rounds 12-in. common shell, seven rounds 12-in. A.P. shot, about 100 6-in. lyddite at bow and battery, about 100 6-in. common at stern, about 400 12-pdr. common, and about 750 3-pdr. A.P. shell. Full charges were used throughout for all guns.

Roughly speaking, about thirty or forty per cent. of the projectiles fired were said to be effective, but there is no evidence to show that any of the 12-in. armour piercers struck the armour. This projectile has a penetrating power of 30 inches of wrought iron, so that it should easily have gone in at one side and out at the other (see diagram showing thickness of armour). It is therefore



pretty clear that either none were fired, or that if they did not miss altogether, they passed harmlessly through the light upper works. The projectiles that hit were, therefore, all shells. With regard to the condition of the ship for resisting the inflammatory effect of shells, not only was nothing removed in the way of splinter-making or inflammable material, but the men's kits, hammocks and mess gear, officers' bedding and furniture, and all the ordinary wood-work of cabins and living places, was left *in situ*. Boats were all in their places, some on the upper deck, others in crutches, some little height above the deck, and others again at the davits. Some spare spars were on deck stowed under the boats. On the other hand, the ordinary precautions against fire were taken as far as the circumstances allowed. The decks were well flooded beforehand, and the

The Belleisle before the firing.

pumps were kept going, delivering a stream of water on to the various decks whilst the ship was being battered. In addition to the ordinary wood fittings, a crew of 130 wooden dummies were placed at the various guns and for passing ammunition. The guns' crews of the 6-prs. were all exposed on the upper deck, those at the 12-in. guns were protected by the battery armour. But, notwithstanding the numbers of shells that struck and burst, the Belleisle was not set on fire. It was stated by Mr. Goschen in the House that there was only a little smouldering fire in one of the cabins amongst some clothes, and this notwithstanding that the woodwork was shattered in all directions, and the whole of the interior of the ship was filled with wreckage. But the *Times* and other reporters who gave account of the firing all believed that the ship was on fire, and spoke of the immense volumes of smoke that rose from the fated ship. This smoke must have been entirely due to the bursting shell. Nor is it remarkable that this should entirely hide the ship, and stream out at every orifice in dense clouds, seeing that the bursting charges of shells estimated to hit were about as under :—

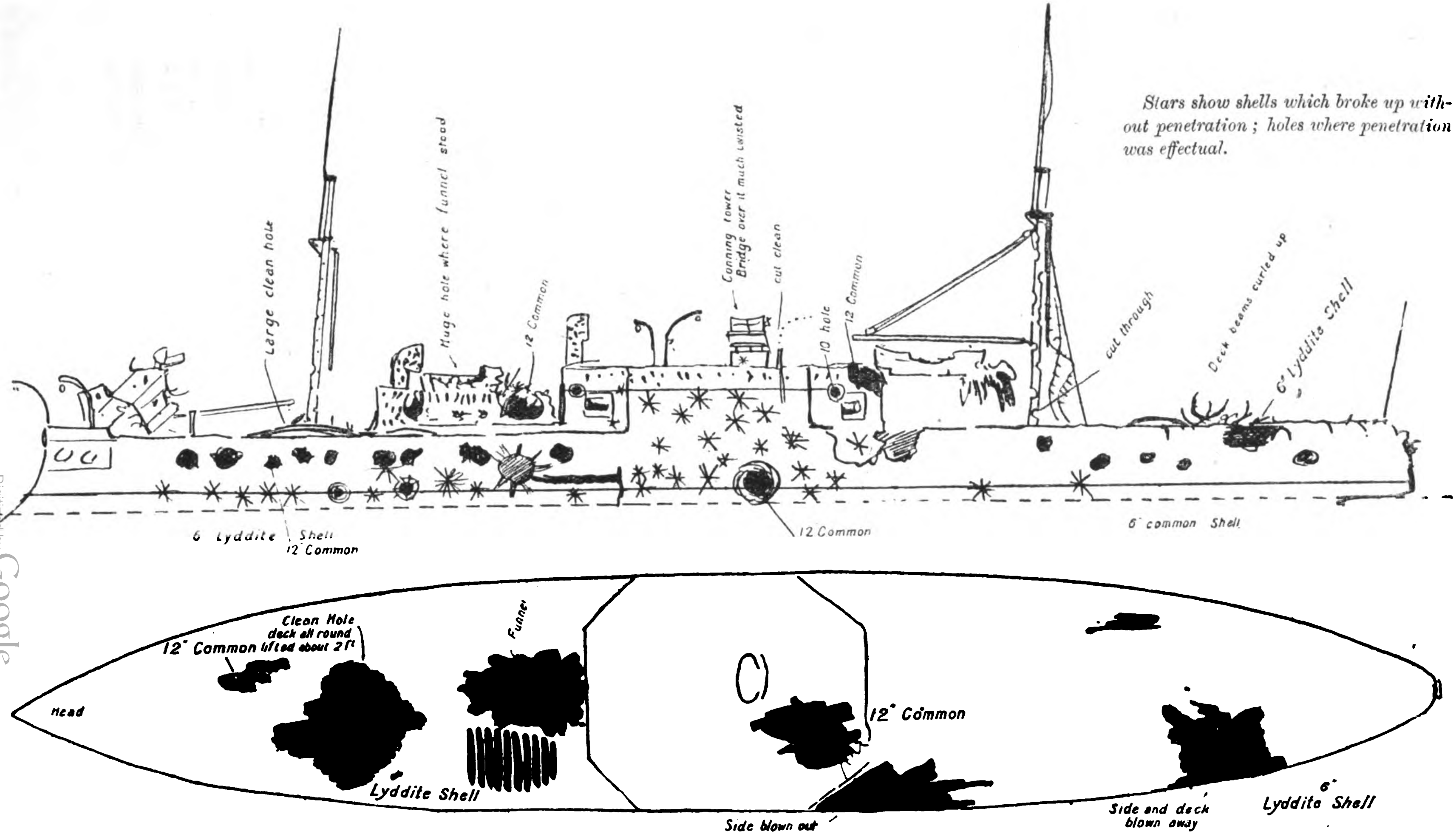
The ship not set on fire.

	Bursting Charges.	
	Gunpowder.	Lyddite.
	lbs.	lbs.
5 12-in. shells	405	—
75 6-in. „	380	500
140 12-pdr. shells	180	—
200 3-pdr. „	35	—
	1,000	500

A battleship in the present day uses some 20 lb. of powder for a twenty-one gun salute, and even in the old days of big smooth bores 100 lb. sufficed. No wonder then that powder sufficient for some fifty salutes on the new scale, and for ten on the old scale, to say nothing of half as much lyddite, produced clouds of dense smoke, through which the gunners of the Majestic could scarcely perceive their target, and which must have considerably affected the accuracy of their fire.

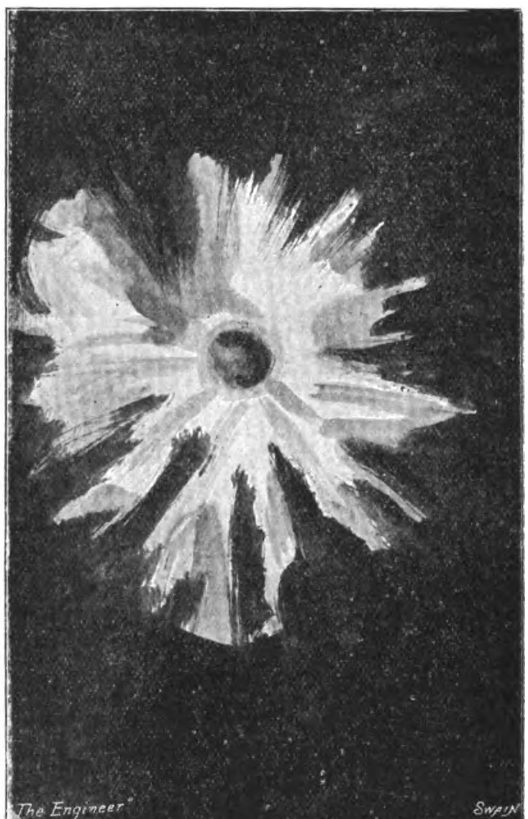
The damage inflicted.

As to the effect of the shells, the armour only seems to have been penetrated in three places, twice by 12-in. shells and once by 6-in. One 12-in. shell, described by the *Times* as a gallery shot, caught the upper corner of the citadel on the port after angle; checked by the massiveness of the target (6-in. wrought iron), it exploded, wrecking



SKETCH SHOWING THE GENERAL EFFECT OF SHELL FIRE ON THE BELLEISLE AS VIEWED FROM OUTBOARD.
(From the *Engineer*.)

the platform on which the conning tower stands, and doing immense damage inside the battery, though the guns themselves and heavier parts of mountings were uninjured. It seems to have been this shell which caused the wreckage of all the dummies, described by the *Engineer*, inside the battery, where it is also said that the sights and "gear" of the guns sustained such damage that, though the guns themselves were uninjured, they could have been of no

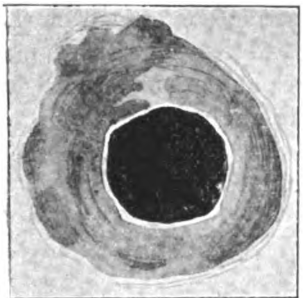


MARK OF LYDDITE SHELL ON ARMOUR OF BELLEISLE.

use. Several small shells, from 3-pdrs. and 12-pdrs., may have passed through the ports and have contributed to this damage. Another 12-in. shell struck on, or just below, the water-line amidships, where the plating varies from 12 inches to 8 inches in thickness. It made a large hole, and, though it did not send anything down into the engine room, was undoubtedly the cause of the sinking of the ship, which took place some minutes after the completion of the practice.

Another entered the unarmoured lower deck forward, and cut the spindle of the capstan, whilst a fourth is reported to have cut down the funnel and utterly wrecked the funnel casing.

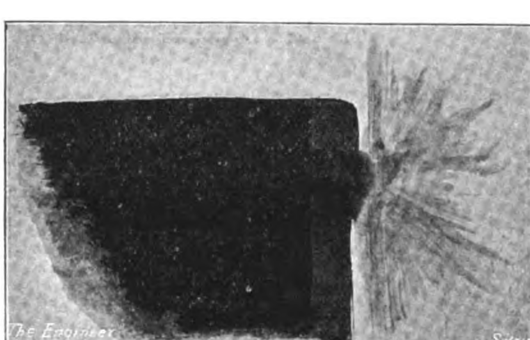
6-in. shells.



HOLE PUNCHED BY 6-INCH SHELL, 10 INCH IN DIAMETER.

With regard to the effect of the 6-in. shells, only one punched its way through the armour; a sketch of the hole is reproduced from the *Engineer*. As is usual where an inferior projectile is used, the hole is much larger than the original diameter of the shell, showing that the head of the shell was crushed and the body expanded, but just succeeded in punching its way through, probably assisted by the lack of toughness of the plate, which was 6 inches thick at the spot struck. All the rest of the 6-in. shells which struck the citadel or belt broke up harmlessly against the armour, with the one exception—pointed out by the *Times*—that several lyddite shells which struck the plating forward, near the water-line, had so hammered it as to cause a dangerous leakage. A 6-in. shell appears to have grazed the edge of one of the gun-ports of the battery, bursting as it did so, but the gun beside the burst was not damaged.

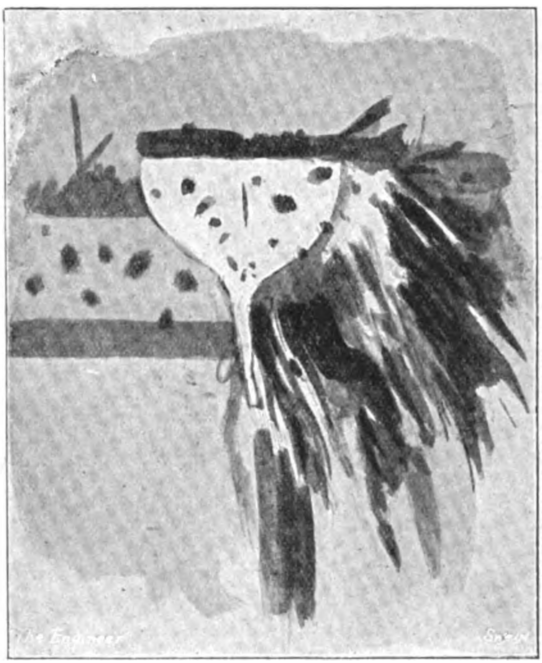
A writer in the *Engineer* argues from the slight effect of the 6-in. common shell, notwithstanding their pointed heads, that, for efficiency, projectiles should either be made of hardened steel with strong tough heads, and if necessary reduced bursting charges, for dealing either with armoured or unarmoured parts, or should be made with the view of holding the largest possible bursting charge; and that the best shell exclusively for the attack of the unprotected structure is a nose-fuzed shell filled with lyddite.



MARK OF 6-INCH SHELL WHICH GRAZED EDGE OF PORT.

The unarmoured parts of the ship before and abaft the central citadel were simply riddled by the bursting shells, both 6-in., 12-pdrs., and 3-pdrs., but there was a marked difference between

the effect of the powder-filled 6-in. fired at the after part of the ship and that of the lyddite shell fired at the fore part. Between the damage done by one and the other there was no comparison. While the 6-in. common destroyed as one might destroy a wood box with an axe, lyddite completely pulverised the wood, acting in a moment much as dry rot acts in a score or two of years. Moreover, where 6-in. common shell burst between the decks, the deck above shewed no sign of it; but it was quite another thing with lyddite. Not only were huge holes blown upwards, but the entire deck was bulged up. These holes are well shown in the sketches taken from the *Engineer.*

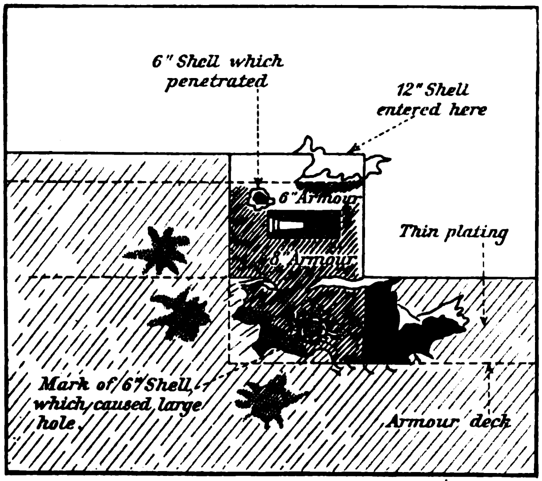


THE ONLY BOAT LEFT ON BOARD THE BELLEISLE.

Some claim that the funnel was cut down by 12-in. common, others that a 6-in. lyddite shell did the damage; possibly both contributed. One of these shells also cut a steam pipe down below, a fragment having passed through the gratings of the funnel. The 6-pdrs. on the top of the battery were all disabled, and all the dummies stationed round them were "killed." Those on the port side were said to have been disabled by the upward radiating action of lyddite shell striking the armour below them, which radiating action is well shown in the sketch. The *Times* correspondent argues from this fact that light guns should be somewhat recessed back from

the armoured side in order to avoid this contingency. The lyddite shell smashed up and overturned the unarmoured structure on the forecastle used as a seaman's head, but the masts, though riddled, stood, although most of the rigging was shot away. The conning tower does not appear to have been hit, though the dummies inside it were broken by the concussion of one of the shells striking the boats and bridge close to it.

The only boat left was the steam pinnace, of which a sketch is given. It is not hard to understand from this sketch why the others disappeared.



Port after corner of Battery, shewing damage to thin plating.

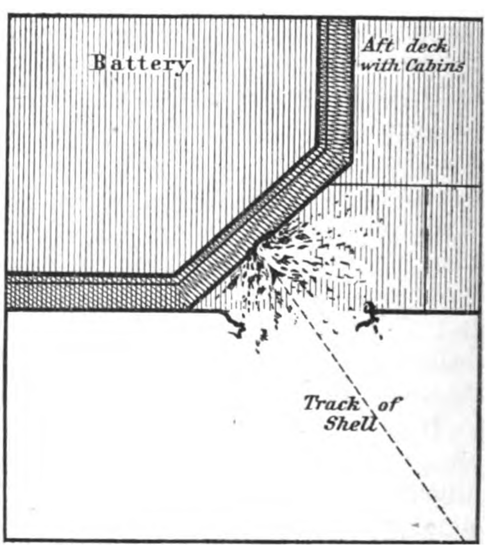
The armoured deck does not appear to have been pierced. A correspondent of the *Engineer* states that several lyddite shells burst close to the deck where it was 2 inches thick without injuring it at all. At least one 12-in. shell also burst close to the deck without causing serious injury, and generally the gas from the shells seems to have sought the line of least resistance, which in the case of the Belleisle was usually upwards.

In fact, there was nothing to show that a shell bursting between decks under the floor plates of a turret or barbette in ships like our Admiral class would do any damage on the other side of the plating. Moreover, the almost prohibitive difficulty of getting a shell to burst where required, namely, exactly under and close to the floor plating of a barbette, is sufficiently obvious.

The 12 and 3-pdrs. did well as regards riddling all unprotected structures, but the difference of effect of the hard steel 3-pdr. shell which pierced deeply into the armour, and the soft steel 12-pdrs. which splashed harmlessly against it, was very noticeable. But the general destruction of unarmoured parts was such as to make it impossible to identify the damage caused by each individual shell of small calibre. All was swallowed up in a general ruin, which is well shown in the sketches reproduced from the *Engineer*. It

seems possible, if not probable, that the 3-pdrs. and 12-pdrs. alone would have fully sufficed to wreck and destroy all the unarmoured parts of the ship, and to put out of action the unprotected guns, so that a large proportion of the 6-in. guns might have advantageously fired armour-piercing projectiles for piercing the battery and water-line. But the object of the experiment being apparently to ascertain the effect of shell and not to sink or destroy the Belleisle, ordinary shells were naturally fired in lieu of armour piercers.

Possibilities of torpedo attack. It was remarked by many observers than an attack by torpedo craft, if supported by even half or a quarter of the shell fire directed against the Belleisle, would have considerable chance of success. The smoke alone which was poured out by the bursting shells in dense volumes would act as a screen for the torpedoists, and the fire of guns quite unprotected by armour would be very wild and slow under a shower of bursting shells. It certainly appears an open question, whether in our larger battleships and cruisers some protection should not be given to the men actually fighting the light quick-firing guns on which we must mainly rely to beat off a torpedo attack, and which might be assailed by the quick-firing guns of supporting ships.



Section of Port Aft Corner of Battery, shewing damage to thin plating by 6" shell.

Lyddite shells. No very exact information is to hand as to the destruction of the unarmoured side by lyddite shells. But judging by the photograph given in the *Engineer* showing the ship being towed into harbour, the damage must have been most extensive, and it bodes anything but well for the water-line of our very numerous protected cruisers. In this connection the effect of a single shell, apparently a 6-in., gives serious grounds for reflection. This shell blew away a large piece of plating, said by the *Engineer* to measure 10 ft. square; which happened in this way.

The shell entered some feet abaft the junction between the thin plating of the lower deck and the armour of the casemate, passed

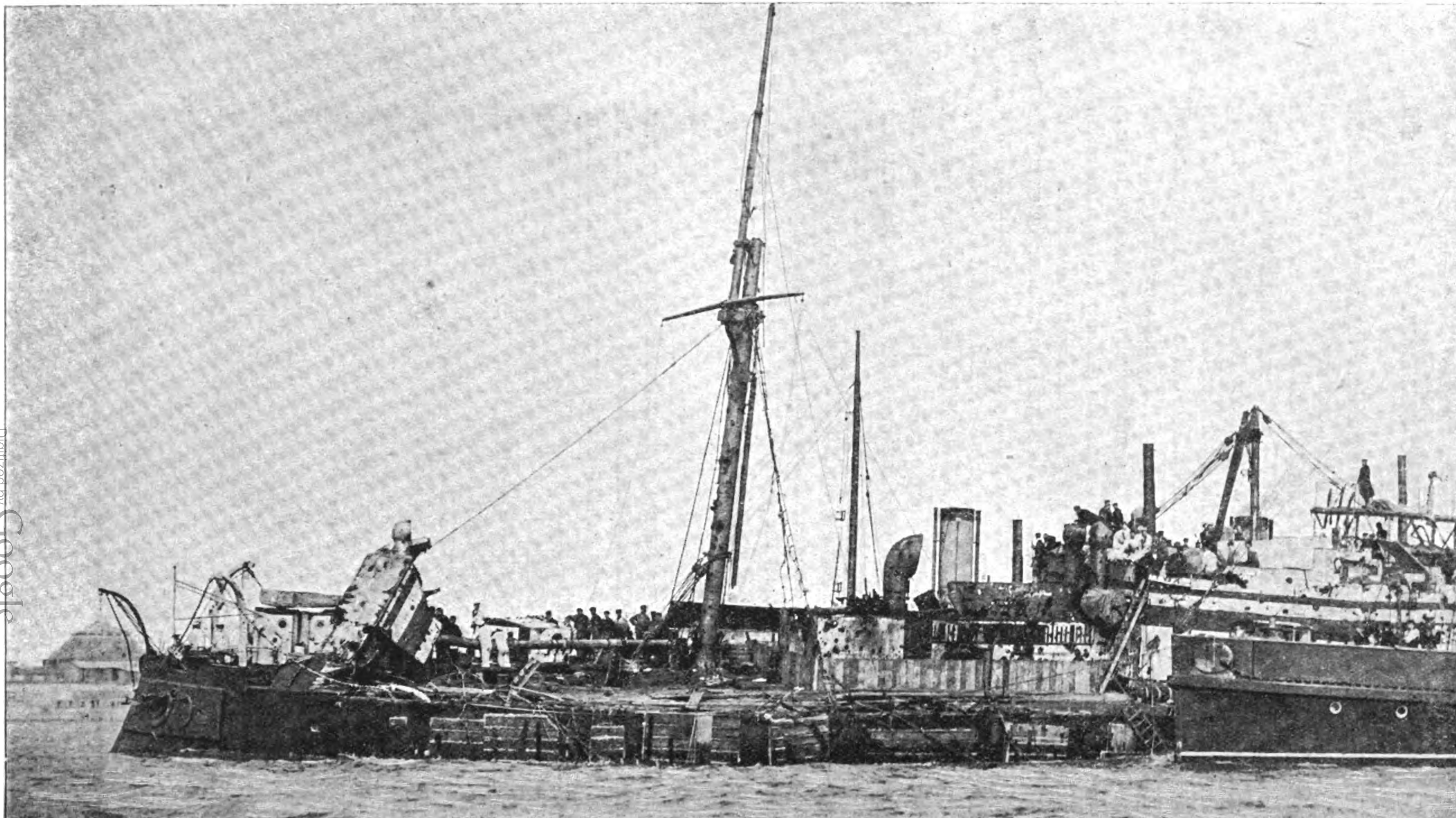
through the outer plating, and burst against the casemate bulkhead. The gases caused by its explosion, unable to affect the casemate armour or armoured deck, rebounded and blew an enormous hole in the ship's side. If the rough sketch be looked at sideways it will be seen that the bulkhead might be taken to represent the sloping armoured deck in, say, the Diadem or Terrible. The object of this sloping armour is to stop shells which strike about the water-line. In doing this there seems a great liability that very large gaps will be blown in the ship's side. The only remedy would seem to be to give the gases free scope upwards inside the ship in some direction where they would be harmless, by no means a simple matter.

Provision for the escape of gases.

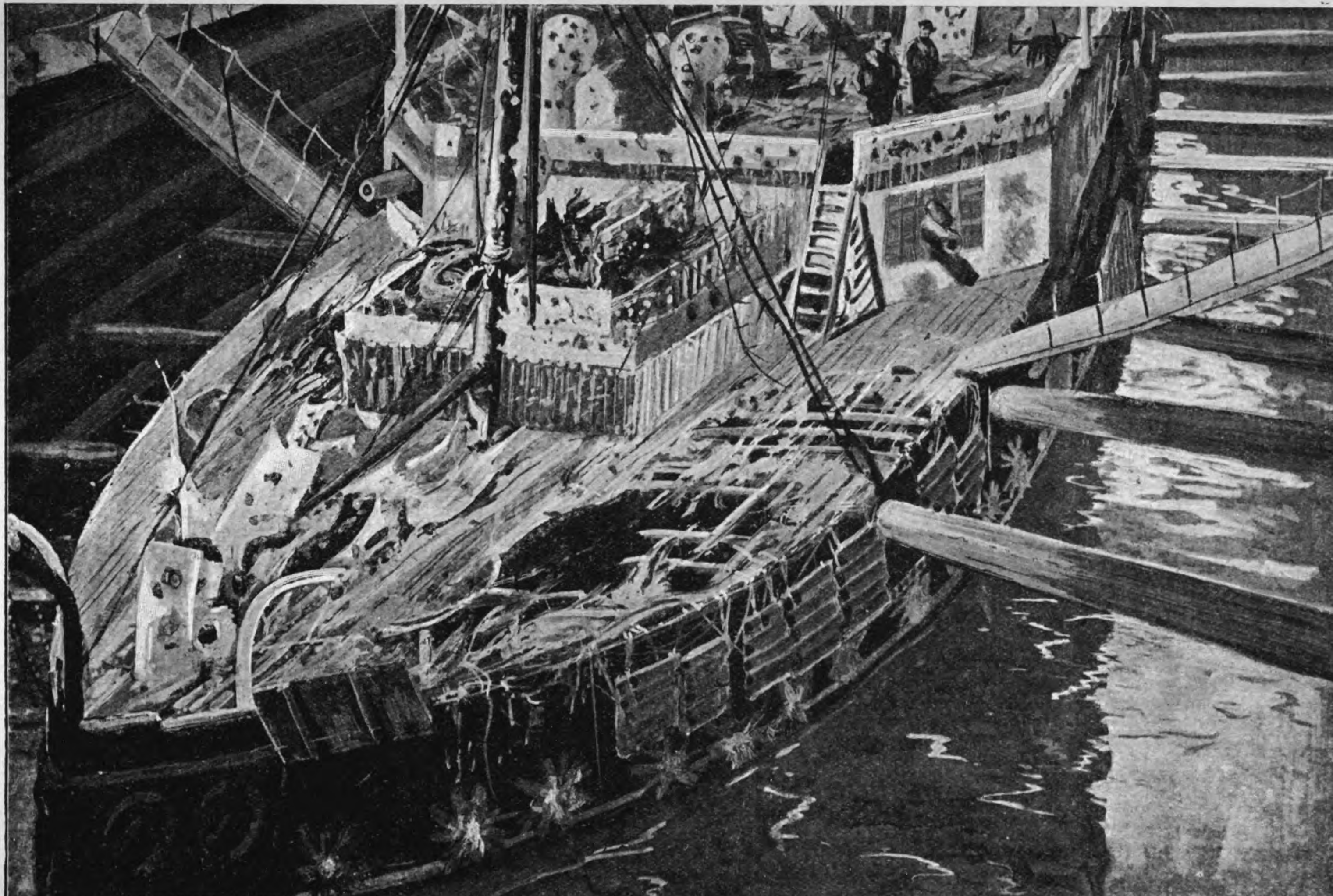
It is perfectly obvious that shells will burst after entering the unprotected parts of all ships, whether battleships or cruisers, but it seems extremely doubtful whether we are in the habit of so building our ships that the gases may do as little destruction as possible. Much might certainly be done to give shells which burst between decks, &c., a chance of discharging their gases comparatively innocuously. Large hatches, somewhat after the fashion of the old skids, might be made between main deck casemates; whilst on the other hand, in unarmoured cruisers, bulkheads or screens should be arranged so as to protect the men between decks from the blast of shells bursting before or abaft them.

Conclusion.

The Belleisle experiments demonstrated most forcibly that armour gives most efficient protection against shell fire, and that the unarmoured parts of a ship are hopelessly untenable under the fire of a number of quick-firing guns.



THE BELLEISLE BEING TOWED INTO HARBOUR AFTER BEING FLOATED. (From the *Engineer*.)



SKETCH OF THE BELLEISLE IN DOCK. (From the *Engineer*.)

CHAPTER III.

Gun Mountings.—Accuracy and Rapidity of Fire.

Rapidity of hitting an important test of efficiency.

The efficiency of a gun depends to a far greater extent than is generally admitted on the rapidity of its fire, or, to put the matter correctly, on the rapidity with which it can hit.

In the days of old, when the rapidity of fire of all guns was fairly equal, the power of a ship naturally depended on the number of her guns, for, the more guns the more hits. This simple state of affairs has completely passed away, and though we still place after a ship's name the number of her guns, no one but a simpleton supposes that the ship with most guns must necessarily be the strongest. Within the last dozen years the rate of fire of both heavy and light guns has increased from three to fivefold, whilst the accuracy has also improved, so that a ship of the present day, say the Cressy, with two 9·2-in. and twelve 6-in., would have no difficulty at all if opposed to the Orlando with her original armament of two 9·2-in. and ten 6-in. (slow-firers), in putting in four hits to the latter's one.

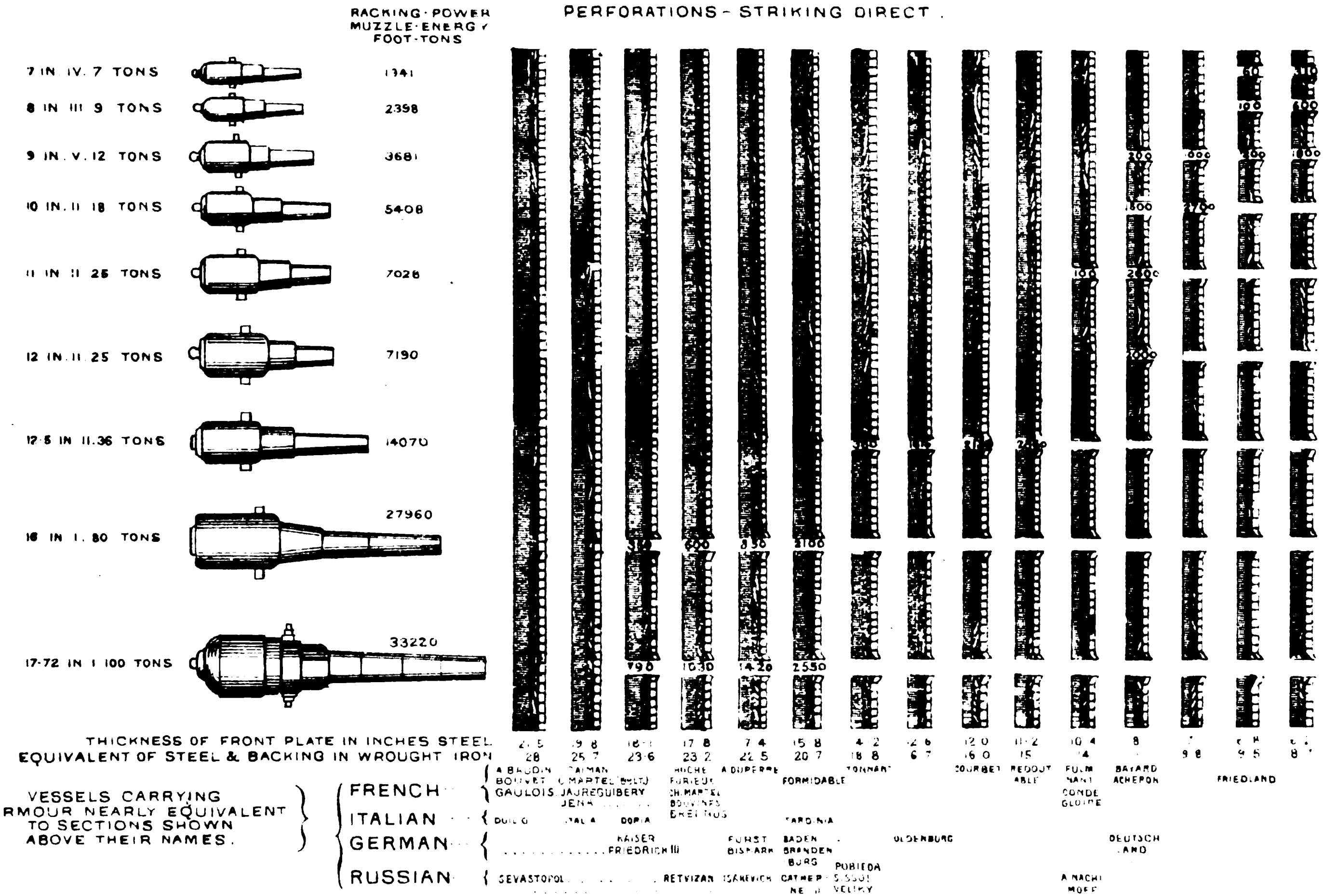
Improvement in gun mountings.

The improvement of gun mountings has contributed far more than anything else to the improved rate of hitting, especially with heavy guns.

Our earlier mountings for heavy B.L. guns, as mounted in the turrets of the Colossus, and subsequently in the barbettes of the Admiral class, barely admitted of one round in three minutes, nor was the rate of fire of their contemporaries across the Channel any greater; indeed, it was probably less.

In the Royal Sovereign class the rate of fire for the heavy guns has increased, and stands at 2 min. 10 secs. (average of some 400 rounds fired under prize-firing conditions), whilst in the Majestic class it stands at 1 min. 9 secs. Across the Channel there has evidently been a similar improvement. An officer of the Bouvet, in a paper contributed to the *Revue Maritime*, claims that the heavy guns of that ship fire a round per minute.

The rate of fire of the heavy American guns at Santiago was very slow, not more than one round in four minutes, if that; but in their latest designs of battleships the Americans claim that they will attain one round per minute from the 8-in. turret guns and nearly the same rate from the heavier guns. The Germans



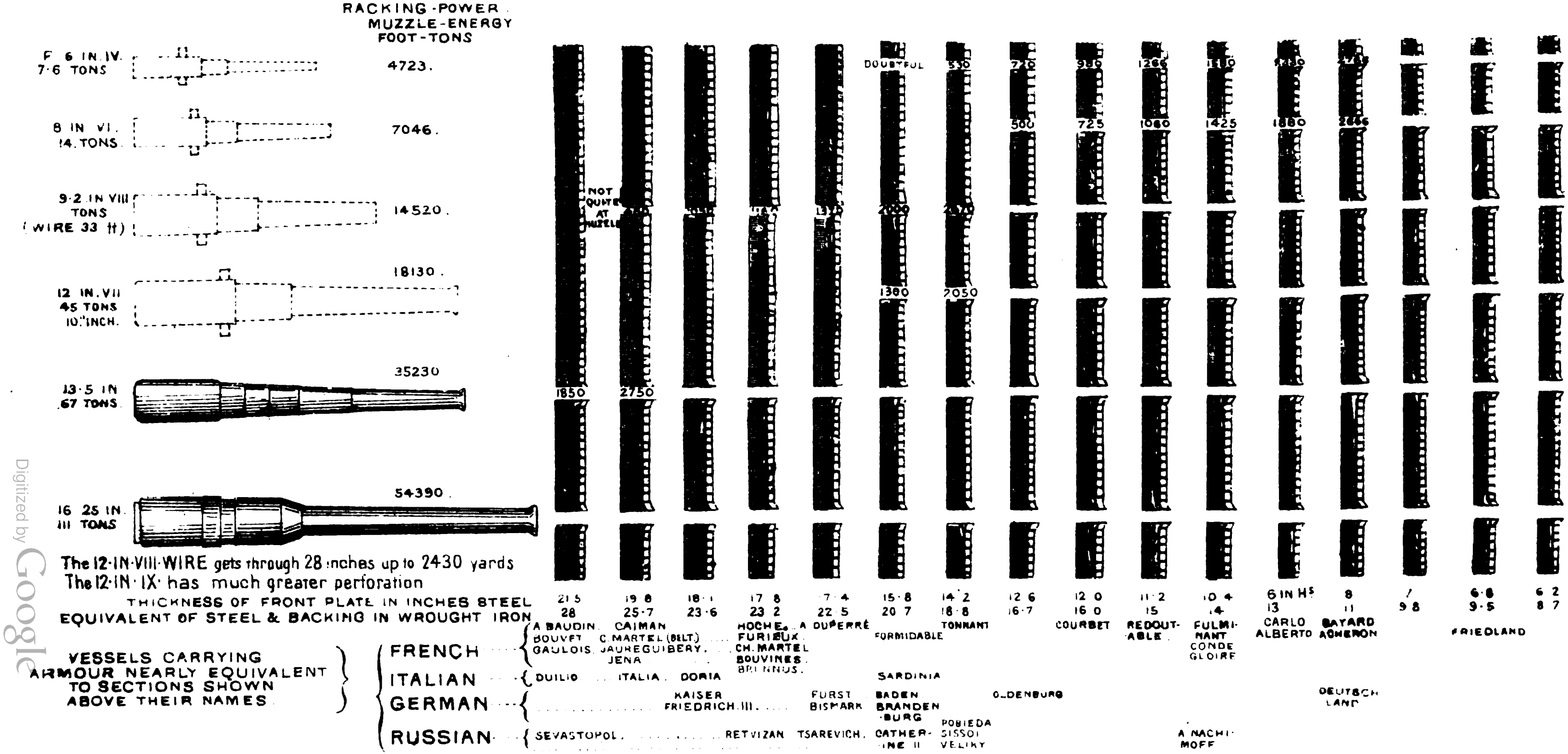
A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS, ARE MARKED IN FIGURES.

SCALE - 20 FEET TO AN INCH. *SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.*

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.

BRITISH B.L. GUNS.

PERFORATIONS-STRIKING DIRECT.



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS, ARE MARKED IN FIGURES

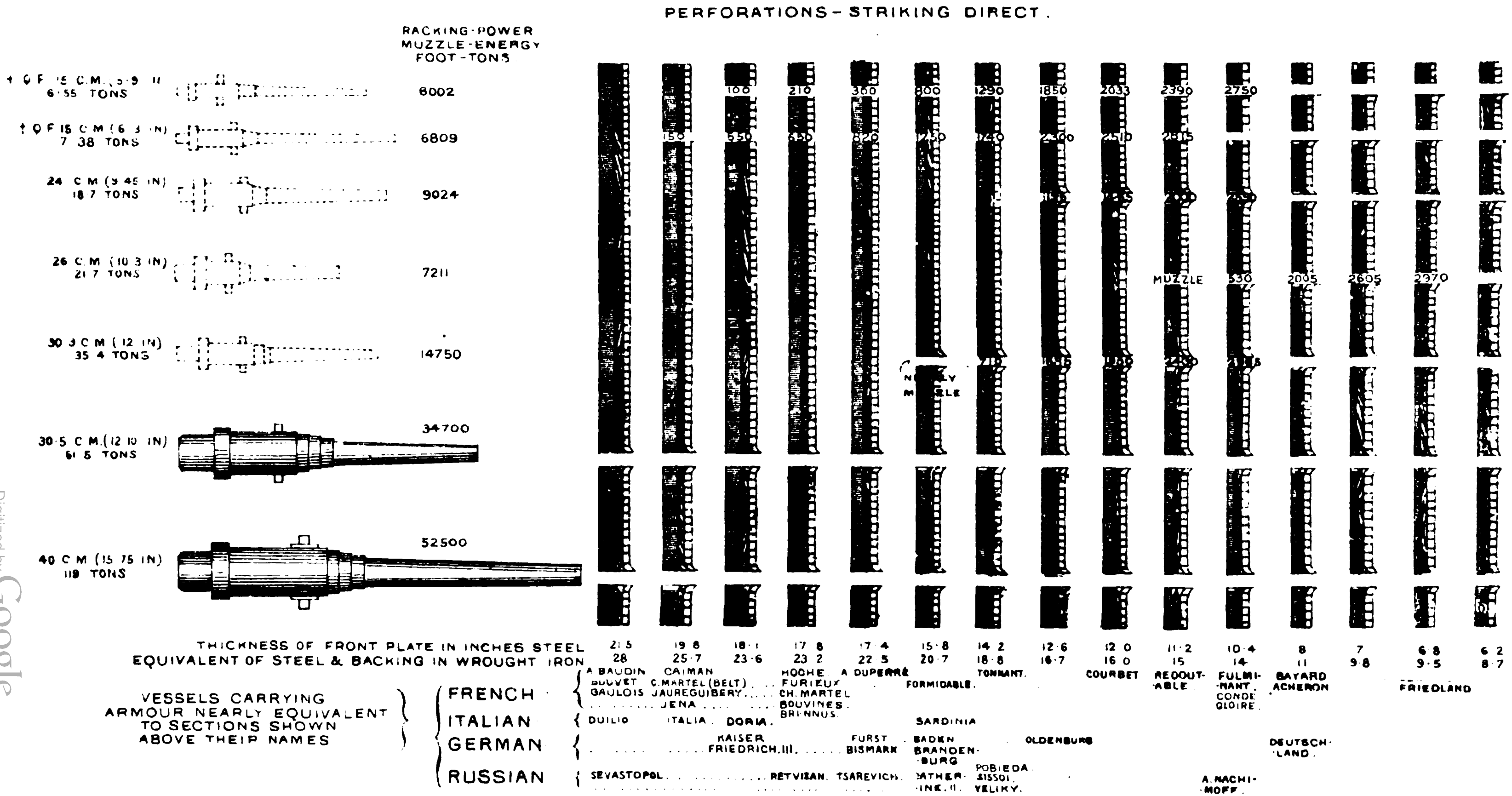
SCALE - 20 FEET TO AN INCH. *SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.*

ALL BACKING IS 18 IN. OF WOOD WITH 1" IN SKIN

NOTE THE 29 TON 10 IN. GUN PERFORATES THE 18·8 IRON (TONNANT) SHIELD AT 1800 YARDS AND ALL THINNER SHIELDS AT ALL RANGES

† *THIS GUN IS TAKEN FROM ELSWICK Q.F. GUN TABLE.* †† *PERFORATIONS CALCULATED BY TRESIDDERS - FORMULA*

PL. II



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION, LESS THAN 3000 YARDS, ARE MARKED IN FIGURES.

SCALE – 20 FEET TO AN INCH. *SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.*

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.

† *TAKEN FROM KRUPP Q.F. GUN TABLE.*

KRUPPS HEAVIEST 21 C.M. (8·27 IN) 20½ TON GUN PERFORATES 23·6 IN. OF IRON AT ALL RANGES

__NOTE__ *IT IS ALMOST CERTAIN THAT THE GERMAN 24 c/m HAS MADE MORE ENERGY, IT IS PROBABLY EQUAL TO FRENCH 24 c/m*

have for some time trusted to rapidity of fire, and are content with 9·4-in. guns in the Brandenburg class in order to obtain rapidity. What their rapidity of fire is has never been announced, but in a pamphlet by Lieutenant B. Weyer, published at Munich in 1901, the following rate of fire is claimed for Krupp guns of 1899 model:—9·4-in.: two to three rounds per min.; 11-in.: one to two rounds per min.; 12-in.: one round per min. These figures, however, have all the appearance of being merely estimates, and are evidently compiled without any reference to actual performances of guns as mounted on board ship.

In some trials that have recently taken place at sea the following rates of fire have been attained with mountings manufactured by the great Armstrong firm: Turret mounting for 9·2-in B.L. Mark X. for Cressy; charge, 100 lb.; weight of shell, 380 lb.; interval between rounds, 32 secs. Turret mounting for 8·3-in. B.L. for Norwegian coast-defence ship Eidsvold; charge, 52 lb.; projectile, 308 lb.; charge from below, projectile from the turret. (1) Gun horizontal and empty, loaded and fired in 15 secs.; (2) gun horizontal and empty, loaded and fired in 27 secs., the turret being trained 30° and gun elevated to extreme elevation after loading. (3) Gun empty, two rounds fired in 38 secs.

Lieutenant Dawson, in a paper read before the Society of Arts, claims a rate of fire of nearly six rounds per minute for the 7·5-in. gun. We believe that four rounds per minute have been fairly easily attained under service conditions, but the 7·5-in. has a projectile only weighing 200 lb., which can be handled by two men, and does not come under the same category as the heavier guns, where the projectile has to be lifted and rammed home by hydraulic or electric power.

Lieutenant Dawson also claims a rate of fire of two rounds per minute for the 12-in. guns mounted on the Vickers system, but his statement, like that of Lieutenant Weyer, appears rather to be a hopeful estimate than the result of a trial under service conditions.

Turret mountings for medium guns.

We give designs of turret mountings for (*a*) one 9·2-in. gun, (*b*) two 6-in. guns, by Vickers & Co. These mountings may be said to be based, as regards their general features, on the designs which have been in use in France for many years, but they embody many excellent features presumably never before combined. The object to be attained is to get great offensive power and good protection with a moderate weight and a small gun's crew.

Let us take first the design for the 9·2-in. gun, which represents the mounting to be supplied to the Hogue. The turret is 6 inches thick, and is rotated by hydraulic power, the engine being placed in the

shallow barbette just below the gun. Hand power is available as an alternative. The recoil is checked by hydraulic buffers of the normal type. The gun is run out by springs. Elevation is given either by hydraulic power or by hand. Thirty-two projectiles are carried in the shallow barbette under the gun. When these are exhausted, projectiles have to be hoisted into the barbette by bringing the rear of the gun platform over one of the two hoists in the deck. The charge is hoisted by hand up the central tube as shown. In loading, the shell is lifted by hydraulic power from the carrier into the loading tray, and rammed home by hand. A rate of fire of two rounds per minute is expected to be attained with considerable ease.*

Turret for twin 6-in. guns.

The turret for twin guns is essentially British, but we have never before built a turret for a smaller gun than a 9·2-in. Foreign nations, especially the French, have shown great fondness for placing one or two quick-firers in small turrets, but we have always preferred casemates. That a turret like the one shown allows of a considerable saving of weight over a two-decked casemate, with which it may well be compared, there is no manner of doubt. It also presents a much smaller target, and the arc of fire is far greater, whilst the protection is somewhat superior, owing to the smallness of the parts.

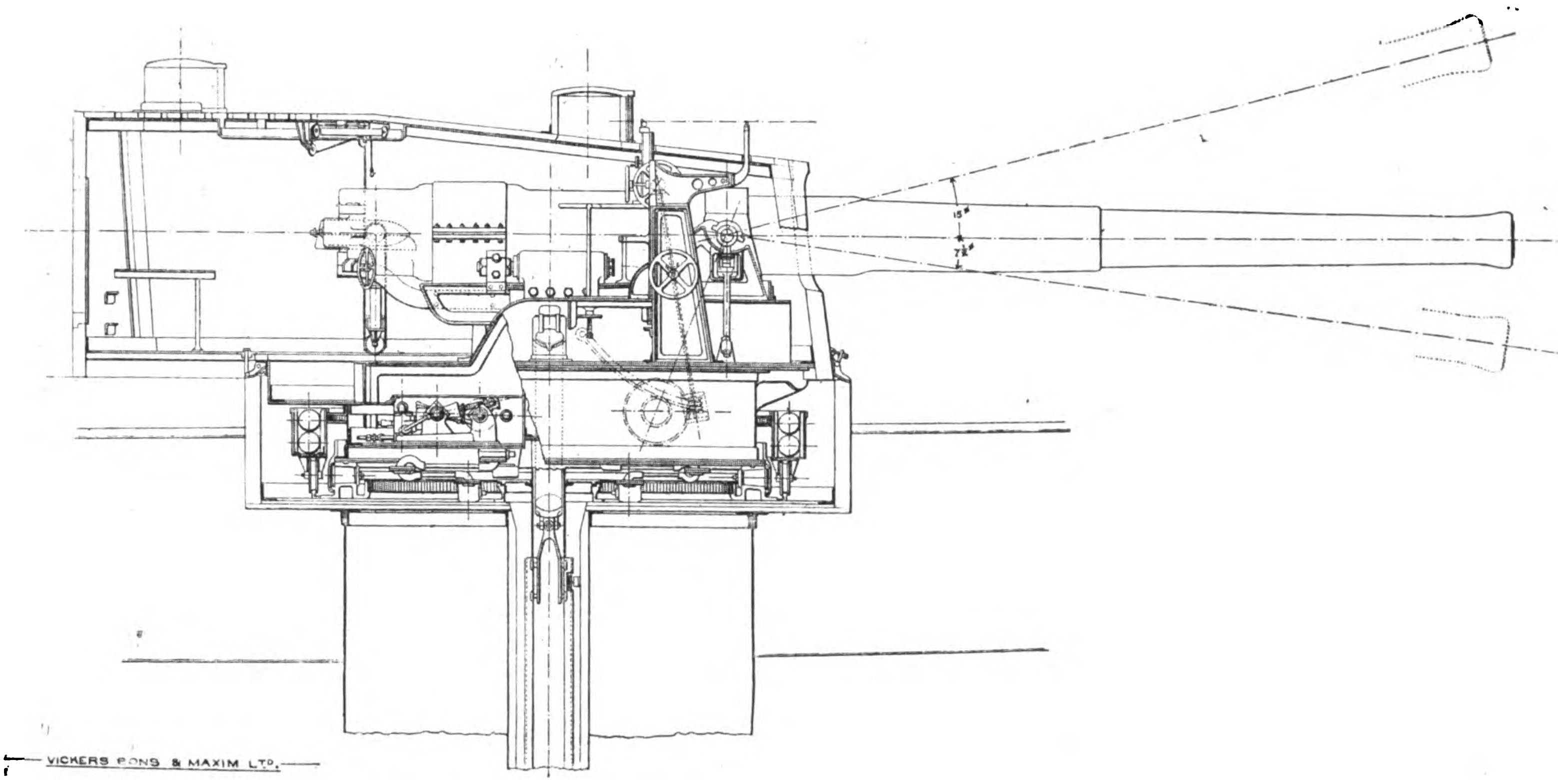
In nearly all the latest designs of ships, turrets are a great feature. The new Italian battleships have all their large quick-firers in turrets. Turrets for the secondary armament form a prominent feature in American, German and Russian designs, and possibly we may follow suit.

The main objection to turrets for light guns is that they are supposed to reduce the rate of fire. Whether this is so we shall now be able to determine. In the heavier guns the rate of fire depends more than anything else on the loading arrangements, but for lighter guns it is more a question of the rate of laying. A 4·7-in. gun can readily be loaded and fired ten times a minute, but when firing at a small target on the move, as at prize firing, five rounds per minute is a fair rate of fire, and six rounds is excellent. The ease of laying and facility of rapid movement allowed by the mounting is therefore of the first importance, and whether the twin turret with its moving weight of nearly 80 tons can be laid as quickly as the guns can be loaded, can only be determined by trial.

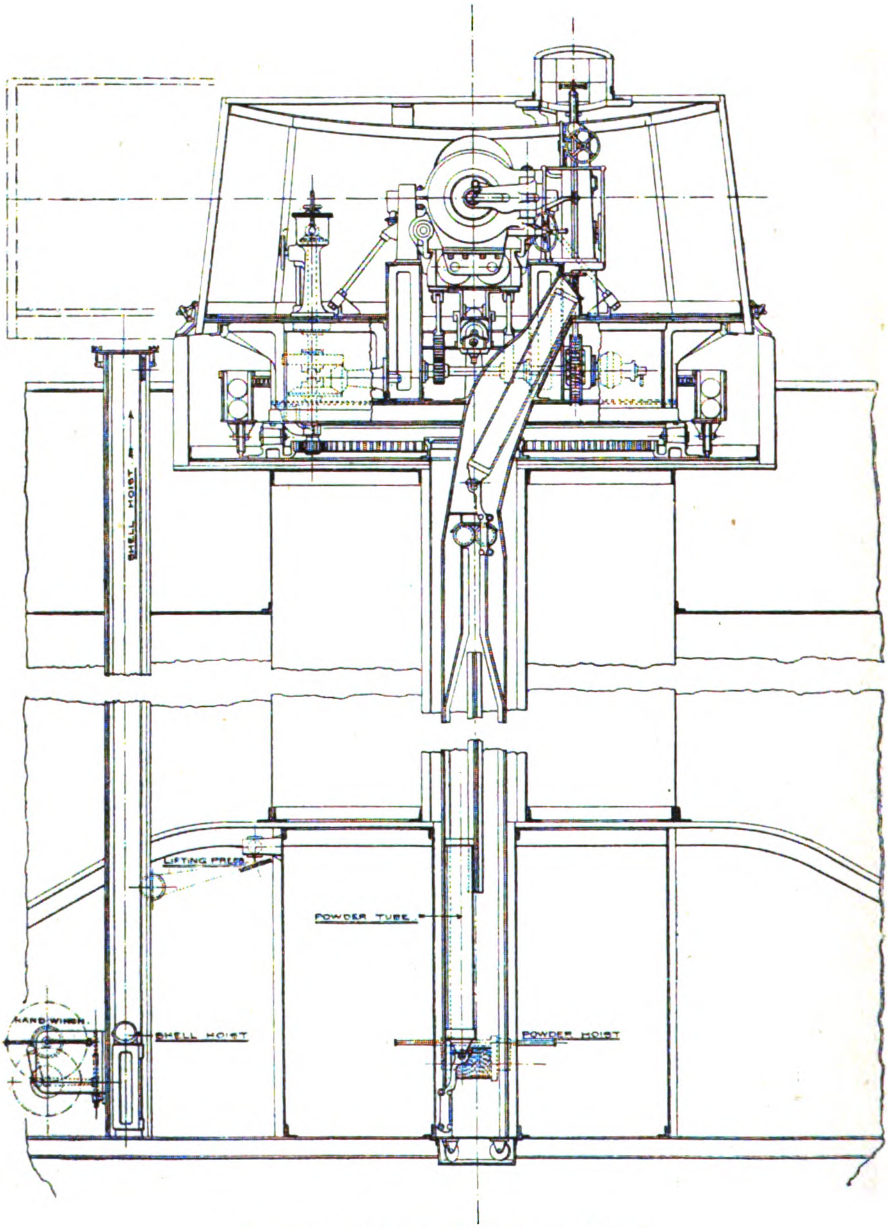
Description of the 6-in. turret.

The 6-in. turret is 4 inches thick, as is also the shallow barbette in which it stands, which shelters the electric motor and other parts of the training gear. 132 projectiles are also stored in the barbette.

* Trials have just taken place at sea in which a rate of fire of three rounds per minute was attained.



Turret for 9·2-inch Guns of the Hogue.



TURRET FOR 9·2-INCH GUNS OF THE HOGUE.

The charges are brought up the central tube by an endless band hoist worked by a motor at the foot of the hoist. The main hoist delivers its cartridges to the lift, but by an ingenious arrangement of an auxiliary band hoist running at higher speed every alternate cartridge is delivered to the right. If desirable, projectiles may be placed in the hoist alternately with, or in lieu of, cartridges. The cartridges and projectiles are loaded independently by hand.

Laying.

Each gun has an independent sighting position with handles conveniently placed for working the training switch to electric training gear and for elevating by hand. Hand training gear can be used if necessary. With electric training the turret can be trained 360° in 30 seconds, and with the hand gear 360° in 1 minute. The guns can be elevated, loaded and fired independently, but must of course be trained together. The total weights are approximately as under with 200 rounds per gun.

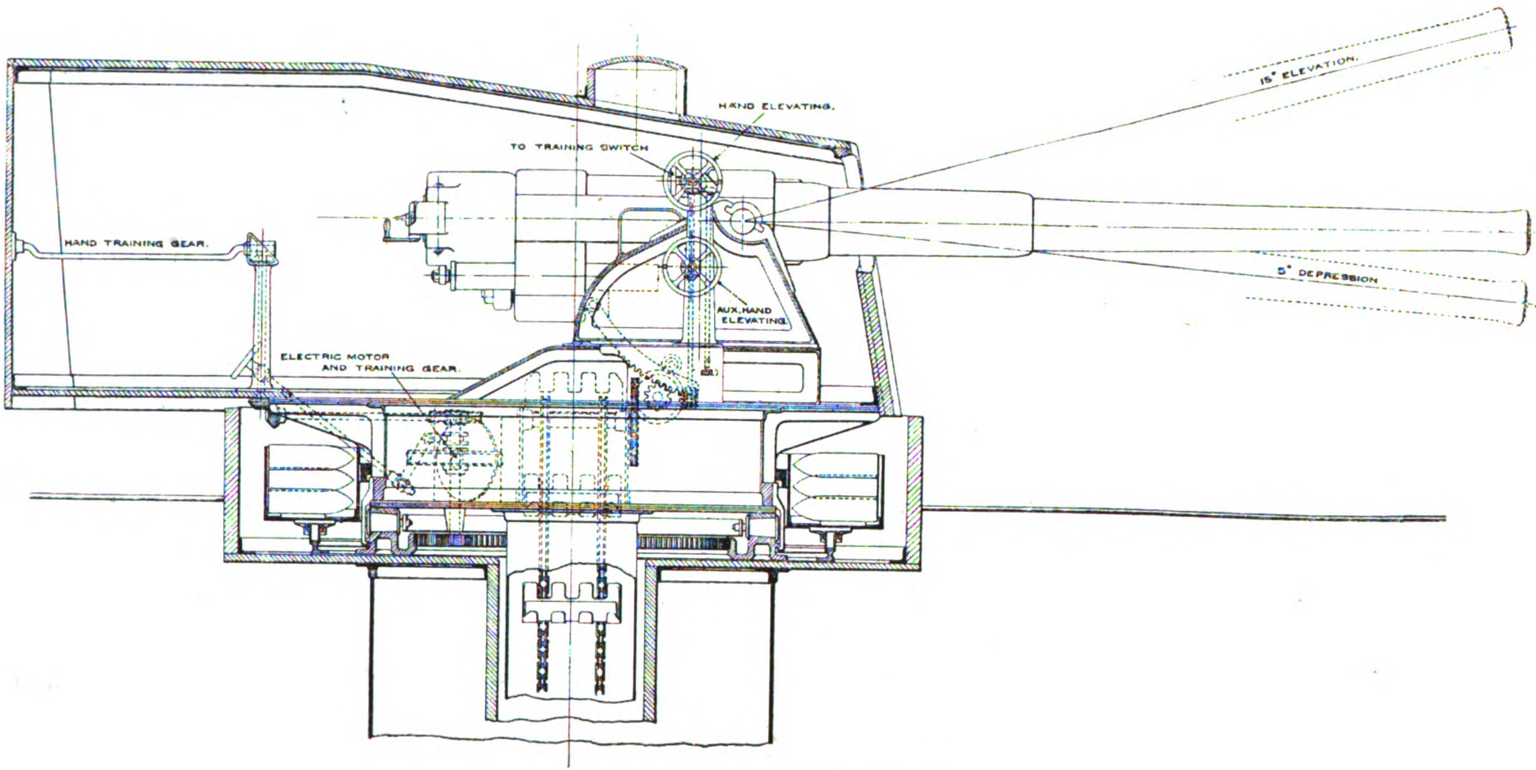
2 guns	15	tons.
132 projectiles in barbette	6	„
Gun mountings, turret and gear	60	„
Barbette and armoured ammunition tube . .	25	„
Ammunition in magazine—400 charges, 268 projectiles	20	„
	126	„

Two 6-in. guns mounted in the open would weigh with ammunition some 52 tons. Looking at the excellent protection given, the extra weight appears to be fully justified.

Accuracy of fire as judged by "prize firing."

The *Naval and Military Record* has devoted several articles to the results of prize firing up to and including the year 1899, from which the following particulars are completed and extracted :—

The conditions of firing vary according to the nature of guns, which are placed in three classes: (*a*) 16·25-in., 13·5-in., 12-in. (old pattern), 10-in., 9·2-in. (old pattern); (*b*) 12-in. Mark VIII. (Majestic, &c.), 9·2-in. Mark VIII. (Powerful and later ships); (*c*) quick-firing guns, 6-in. to 4-in. The (*a*) guns fire for twelve minutes, the ship steaming 8 knots, and the range varying from 1,400 to 2,000 yards ; target as shown for 9·2-in. gun in diagram ; height, 15 ft. ; breadth, top 20 ft., bottom 50 ft. ; area, 525 sq. ft.. The (*b*) guns fire for six minutes only at the same target as above. The (*c*) guns fire for two minutes, the ship steaming 12 knots, and the range varying from 1,400 to 1,600 yards; target as shown for 6-in. guns in diagram: height, 15 ft.; breadth, 20 ft ; area, 300 sq. ft.



TURRET FOR TWIN 6-IN. Q.F. GUNS.

The heavy guns have the disadvantage of firing at a longer range than the quick-firing guns. Moreover, the distance varies a good deal, often 100 yards or more between successive rounds, whilst with the quick-firing guns 30 yards is a large variation. On the other hand, the target is 70 per cent. larger for the heavy guns, and the speed 4 knots less. The range is known in all cases.

As a comparison it may be stated that a turret or barbette for two heavy guns is usually some 25 ft. high (measuring from water-line) and 32 ft. in diameter, area of target 800 sq. ft., or 50 per cent. bigger than heavy gun target.

A turret or casemate for quick-firing guns may be taken as presenting a target of about 150 sq. ft. in area, about half that of the prize-firing target for quick-firing guns.

The following table gives a summary of the performances of the various heavy guns during the years 1898–99 :—

TARGET, 15 FEET HIGH. AREA, 525 SQUARE FEET. RANGE, 1,400-2,000. SPEED, 8 KNOTS.

GUN.	Rounds per Gun per Minute.	Hits per Gun per Minute.	Percentage of Hits to Rounds Fired.	Time required to make one Hit.	Weight of Metal Hitting per Gun per Minute.	Remarks.
				minutes.	lbs.	
16·25-in.	0·25	0·04	16	52	72	These guns fire for twelve minutes
13·5-in.	0·40	0·12	30	8	150	
12-in., old pattern	0·36	0·11	31	9	79	
10-in.	0·69	0·22	32	4½	110	
9·2-in., old pattern	0·70	0·29	41	3½	110	
12-in. Mark VIII., Majestic, etc.	0·90	0·27	30	3¾	230	Fires for six minutes

The rapidity of fire depends mainly on the mounting, the slow rate of fire of the 16·25-in. and old-pattern 12-in. being mainly due to inferior mountings. On the other hand, the 12-in. guns of Majestic class, with their improved mountings, beat even the 9·2-in. guns in rate of fire.

The inaccuracy of the 16·25-in. gun is probably due to the old-fashioned mounting. The 9·2-in. guns are nearly all on hand-worked mountings with light shields, and are apparently easier to lay accurately than the guns with heavy armour protection, but owing to their exposure their fire in action must needs be inferior.

The performance of the quick-firing guns is given below for 1898–1899:—

TARGET, 15 FEET HIGH. AREA, 300 SQUARE FEET. RANGE, 1,400-1,600. SPEED, 12 KNOTS.

Gun.	Rounds per Gun per Minute.	Hits per Gun per Minute.	Percentage of Hits to Rounds Fired.	Weight of Metal Hitting per Gun per Minute.
				lbs.
6-in.	3·8	1·07	28	107
4·7-in.	5·2	1·65	32	74
4-in.	5·7	1·75	31	42

Although the 4-in. gun can be loaded more than twice as fast as the 6-in., the gain in rate of fire is only a bare 50 per cent. The accuracy of all three calibres is very similar.

Seeing that the heavy and quick-firing guns fire at different targets, under different conditions, an exact comparison cannot be made, but if heavy guns are used for firing shell at unarmoured parts, as is sometimes advocated, they naturally come in for comparison with the quick-firers, when it is evident from the column, "Weight of metal hitting," etc., that for this kind of work the quick-firer beats the heavy gun quite out of the field. Thus a single 4·7-in. gun of 2½ tons gets in more metal per minute than the gigantic 16·25-in. of 110 tons, while the 6-in. Q.F. beats the old-pattern 12-in., and (with due allowance made for different size of targets in prize firing) is decidedly superior to the 10-in. or 9·2-in. Of all the heavy guns the 12-in. Mark VIII. is the only one that does respectably with shell, and this gun is barely equal to a pair of 6-in. Q.F., weighing together about one-quarter of the 12-in.

The function of the heavy guns is essentially to pierce the armour which stops the quick-firing projectiles; thus, given the necessary penetrating power, they must mainly be judged by the number of hits, in which the 9·2-in. and 12-in. Mark VIII. do best. As explained in the section on armour, if a gun has a considerable reserve of piercing power more *effective* hits will be obtained, as the oblique hits will pierce in lieu of glancing off. Thus the 12-in. would always be superior to the 9·2-in., even against armour which the latter could penetrate.

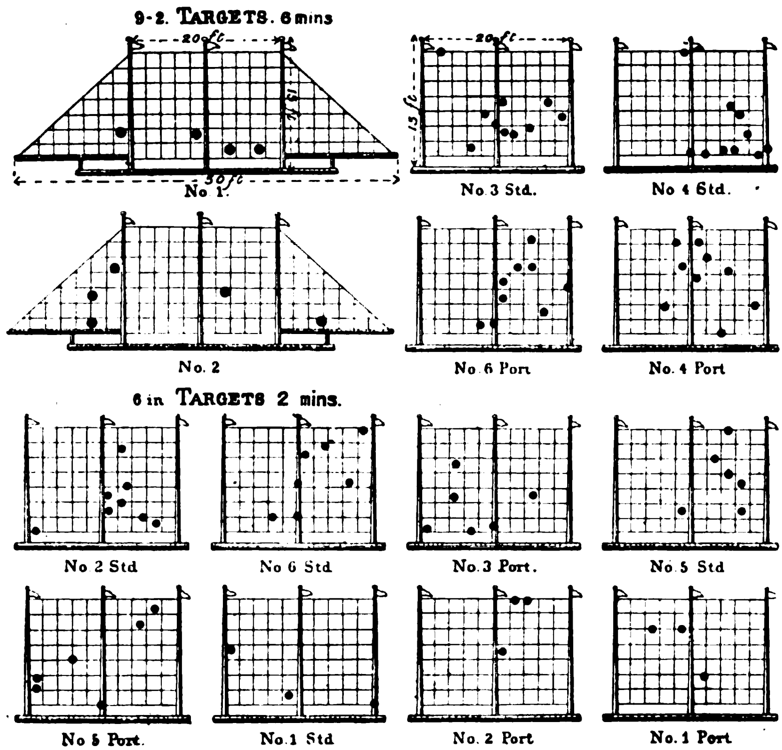
It is evident that there is a wide field for improvement in heavy guns by increasing the rate of fire, and if, as promised, the rate of fire of 9·2-in. and 12-in. can be doubled, it will be a very great advance.

What the lighter guns need is greater penetration, so that the numerous hits which they deliver may go home, and may not glance off harmlessly.

We reproduce a diagram, published by the *Naval and Military Record*, which shows that there is still ample scope for improvement in shooting which can be attained by diligent training and constant practice. It shows the targets made by the Terrible under Captain P. M. Scott, C.B. It is not easy to compare the results obtained by the Terrible's 9·2-in. guns with that attained in the service generally, because the Terrible's mountings stand alone, but it appears to be about twice as good as the average. The rate of hitting by the 6-in. gun is just three times the average rate.

Possible improvement in accuracy.

The Terrible's record.



Targets made by Terrible at Prize Firing, 1900.

Abstract of Result of Prize-Firing Practice, H.M.S. Terrible, 1900.

Gun.	Rounds per Gun per Minute.	Hits per Gun per Minute.	Percentage of Hits to Rounds Fired.	Time required to make one Hit.	Weight of Metal Hitting per Gun per Minute.
				minutes.	lbs.
9-in. Mark VIII. . . .	1·16	0·75	60	1·3	285
6-inch Q.F.	4·3	3·33	77	0·3	333
Average figures for 6-in. Q.F. throughout the Service.	*3·8*	*1·07*	*28*	*0·9*	*107*

These excellent results were obtained in a ship which had been two and a half years in commission, and in which aiming practice took place almost daily on a principle worked out by Captain Scott himself. There is every reason that similar hard work and untiring diligence should produce equal results in other ships. The Majestic in the Channel and the Cæsar in the Mediterranean attained a rate of hitting of 2·2 shells per minute with the 6-in. gun, and there is no doubt that far more attention is now paid to gunnery practice than ever before.

Long range fire. It is perfectly obvious that two cruisers, or indeed two battle-ships, which fired with anything like the accuracy attained at prize firing, would, if they closed to 1,500 yards, make a very speedy end of the affair. This is also borne out by the Belleisle experiments. But the history of all fighting, both afloat and ashore, tends to show that a range will be taken up at which there will be an immense deal of missing, at least on one side, and that an action will take some time to fight out, and will not be finished in five minutes or so, as must be the case if ships close in at once. It is very important to know at what range to open fire, and at what range it may be expected that fire will become really efficient.

Long range practice. Various trials have taken place during the past year, especially in the Channel and Mediterranean, both with the range altering quickly and fairly constant. Practice has been carried out at all ranges between 3,000 and 7,000 yards.

So far as can be ascertained the result of the practice has been distinctly promising. Without crediting all that has been published of cruisers making 30 per cent. of hits at a target supposed to represent another cruiser at 5,000 yards, it is certain that good practice has been made at ranges never before dreamt of, at any rate for real fighting. If even 10 per cent. of hits can be made at 5,000 yards, and 5 per cent. at 7,000, as has been stated, it is most decidedly worth opening fire at the latter range in a chase, and very possibly at the opening of a regular engagement, whilst practice at long ranges will in future form part of the regular exercise of every ship in commission.

Method of increasing power of guns. It was stated above that owing to the increase of armour protection, more piercing power is required for the quick-firing guns. When greater power is aimed at, three courses are open: (*a*) To substitute guns of larger calibre; (*b*) To substitute guns of greater length; (*c*) To increase the charge.

(*a*) Is a radical step scarcely feasible, as a rule, without almost reconstructing the ship. It entails entirely new ammunition, and may so increase the weight of projectile as to be a

very serious matter when the loading by hand of a quick-firing gun is in question.

(*b*) Utilises the old projectiles, and possibly the old charges, which, however, may have to be increased. It may entail new mountings, and in many ships is out of the question owing to lack of room.

(*c*) Is a comparatively simple matter at first sight, but is liable to entail all kinds of difficulties, of which prohibitive stress to the mounting comes first, closely followed by increased erosion to the bore, the erosion being very serious if cordite be used.

Increase of power by giving more velocity.

Owing mainly to the great erosion which appears inevitable when large charges of cordite are used, proposals have been made to substitute for cordite some other propellent which it is said will give the necessary power without undue erosion. But whether the increase of power can be attained by improvements in the propellent without countervailing disadvantages has yet to be demonstrated.

Cordite versus nitro-cellulose powders.

It is claimed for the new nitro-cellulose powders that they give higher velocities than cordite for the same erosion, or less erosion for the same velocity. But for similar velocities some 25 per cent. more powder is required, and if the velocity is to be increased the weight of the nitro charge may rise to 50 per cent. above that of cordite, and the bulk will increase in a higher proportion, entailing serious difficulty in loading arrangements. There has been much exaggerated talk about erosion. If a gun can last through an action without serious loss of efficiency, it can easily be changed when the ship gets her necessary refit. Cordite is very cheap, charge for charge, as compared with nitro powder. The money saved by using cordite should be put into reserve guns and plant for quickly renewing eroded barrels, then we can wear away our inner tubes with a light heart. It has taken us ten years to supply all our guns with cordite; even now some are using brown powder. We shall therefore have to do with cordite for many years to come, and it is absolutely essential that our guns should have sufficient power with cordite charges. If nitro-cellulose comes in and increases their power they will have something to spare, but guns of increased power are required at once, and since the 6-in. falls short of what is needed, the best policy is to go in boldly for the 7·5-in. in new ships, and where possible replace 6-in. guns in the older ships, at the same time pushing on the work of improving the rate of fire of the 9·2-in.

NOTES ON TABLES OF ORDNANCE.

THE authorities on which the data in the Ordnance Tables are based are as follows:—

Speaking generally, the British and United States Tables contain figures from official sources. The Tables for the Continental powers are mainly taken from the *Austrian Marine Almanack.* The energies and perforations, however, are worked out independently, as explained below. The Ordnance Tables of Elswick, Vickers, Schneider-Canet, and Krupp guns are obtained directly from the manufacturers, and the data in them are given on their authority. In justice to British manufacturers, the compiler would call special attention to the fact that the very high velocities, 2,740 ft.-secs. and over, which occur often in the foreign tables, are very rarely found in the guns marked with an asterisk, that is, existing guns, and when actually achieved with new guns cannot be long maintained. In the course of time lower velocities are generally substituted. Elswick explains the possibility of obtaining such velocities in a footnote, but limits the columns to existing guns, except one 12-in. gun under manufacture. The fact is, that just as it has been found injudicious to work a boiler with forced draught, so it has hitherto been found undesirable to use so large a charge as to give more than 2,600 to 2,700 ft.-secs. in a 45-calibre gun with projectiles of the British or American type $\left(\frac{w}{d_3} = \cdot 49\right)$. A 50-calibre gun should give another 80 ft.-secs., and with some of the nitro-cotton powders now coming forward it may be possible to reach 2,800 to 2,900 ft.-secs., but it will be some time yet before any guns with such very high velocities are actually mounted afloat. Such enormous charges as 360 lb. of smokeless powder, which is said to be the charge of the 12-in. gun in America, to give a velocity of 2,900 ft.-secs., never seem likely to be adopted.

There are very few alterations this year in the British and foreign service Tables. The Russian Table is the best obtainable, but is certainly not up to date, and readers are cautioned not to be misled by it. The particulars given in the margin are fairly well authenticated. The German Navy also possesses more powerful 24-cm. guns than those shown.

Tresidder's formula being now recognised and used in official papers, and this even for velocities below 2,000 ft.-secs., it has been concluded that it is best to follow the course indicated in the *Annual* for 1896, p. 363, that is to say, to employ Fairbairn's or Maitland's formula only for velocities up to 1,580 ft.-secs. For these low velocities they have been thoroughly tested and found good, and for these it would be a mistake to alter the existing tables based on them. About 1,580 ft.-secs. the formulæ of De Marre, Krupp, Tresidder, Maitland and Fairbairn all agree fairly well. At this point, then, it is convenient to "shunt," as it were, from the Fairbairn, on to the Tresidder curve, for British Tables. Krupp's formula gives nearly the same results as Tresidder's, and it makes little difference which of the two is employed, and in some foreign Tables where Krupp's formula has been used it is left undisturbed, Tresidder's being often added to enable a comparison to be made. In Krupp's formula weight tells more in comparison to velocity than in Tresidder's. The actual formula used is nearly always stated on the face of the Table.

BRITISH RIFLED ORDNANCE.

(Compiled from the official "List of Service Ordnance, 1898," and supplemented by subsequent information.)

B.L. GUNS.

Ordnance.										Charge (full).	Charge (cordite).		Projectile.						Ballistics (with full charges).				
Nature.					Chamber.		Rifling.														Perforation of wrought iron.		
							Twist one turn in																
Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Diameter (at largest).	Length to base of projectile.	Least at breech.	Greatest at muzzle.	System.†	Weight.‡	Weight.	Size.	Diameter.	Weight.§	Bursting Charge of Common Shell.	Value of $\frac{d^3}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	At muzzle.	At 1000 yards range.	At 2000 yards range.
				calbs.	ins.	ins.	cals.	cals.		lbs.	lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ft. tons	ins.	ins.	ins.
16·25-in.	110½ tons.	I. II. & III.	524·0	30·0	21·125	84·5	Various in the newer patterns.	30	P. Elswick, Hook, or Modified Pl. Section, the last in the new guns.	960 S.B.C.	..	..	16·25	1800	‡‡193 **179½	0·147	0·420	2087	54,390	492	38·0	34 6	31·7
13·5-in.	69 & 67 tons.	I. II. III. & IV.	433·0	30·0	18·0	66·5		30		630 S.B.C.	..	..	13·5	1250	**85	0·146	0·508	2016	35,230	511 526	33·0	30·2	27·6
12-in.	45 & 46 tons.	III. IV. V. & V.w	328·5	25·25	16·0	48·0		35		295 P.Br.	88 8	30	12·0	714	31 13/16 ‡‡95 **79	0·202	0·413	1914	18,130	403 394	24·4	21·5	18·9
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		..	167 8	50	12·0	850	80–1 9/11	0·169	0·492	2367	33,020	718	36·8	32·7	29·4
12-in.	50 tons.	IX. Wire	496·5	40·0	17.5	87·2		..		..	201 8 9 8	50 3¾	12·0	850	"			2481 a	36,290	726	39·7	35·4	31·6
10-in.	29 tons.	II. III. III.A & IV.	342·4	32·0	14·0	54·0		30		252 P.Br.	76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	498	24·8	21·8	19·3
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		140 P.Br.	42 0	30	9·2	380	18	0·223	0·488	1781	8,356	411 392	18·3	15 9	14·4
9·2-in.	24 & 22 tons.	III. V. VI. VI.A&c & VII.	310·0	31·5	12·0	43·0		30		164 P.Br.	53 8	30	9·2	380	‡‡33 **30 6/16	0·223	0·488	2065	10,910	455 496	22·9	19·8	17·2
9·2-in.	25 tons.	Wire VIII.	384·0	40 08	10·5	53·15		..		..	63 0	40	9·2	380	..	0·223	0·488	2347	14,520	581	27·6	23·9	20·7
9·2-in	27 tons.	Wire IX.	445·25	46·74	13·0	71·215		..		..	103	44	9·2	380	..	0·223	0·488	2640	18,400	681	33·3	28·9	25·0
8-in.	14 tons.	III.	222·5	25·1	10·5	34·5		35		104 P.Br.	28 12	20	8·0	210	13 10/16 ‡‡29	0·305	0·410	1953	5,554	427 397	16·8	13·8	9·5
8-in. 8-in.	15 tons. 14 tons.	IV. VI.	254·5	29·61	10·5	38		35 30		118 P.Br.	32 10	20	8·0	210	‡‡18½	0·305	0·410	2150 2200	6,730 7,046	449 503	19·3 20·0	16·0 16·6	13·2 13·7
6 in.	5 tons.	III.	170·7	25·53	8·0	26·75		35		36 E.X.E. 48 E.X.E.	14 12	20	6·0	100	7 4/16 **9 13/16	0·360	0·463	1960	2,665	533	13·4	10·7	8·9
6 in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75		35 30		48 E.X.E.			6·0										
5-in.	38 cwt. 40 cwt.	II. III. IV. & V.	139·15	25·07 25·0	5·75	19·05		25		15·5 S.P.	4 7½	7·5	5·0	50	7 12/16 3 6/16	0·500	0·400	1750	1,062	559 531	8·8	6·6	5·3
4-in.	23 cwt. 26 cwt.	II.II.A III.III.A IV.V.& VI.	120·0	27·0	5·3	18·5	120	30		12 S.P.	3 1	5	4·0	25	1 12/16 3 3/16	0·640	0·391	1900	625	544 481	7·7	5·4	4·0
12-pr.(3 0)	6 cwt.	Wire I. (L.)	66·75	19·66	3·2	8·35	105	28		..	0 12 7/16	5	3·0	‖12·5	..	0·720	0·463	1553	209	697	..	..	..

M.L. GUNS.	17·72-in.	100 tons.	I. (L.)	391·85	20·48	19·7	59·72	150	50	P.Pl.	450 Pr[1] Bl. or Pr[3].	..	..	17·72	2000 0	106	0·157	0·359	1548	33,220	332	25·2	23·5	21·7
	16-in.	80 tons.	I.	321·0	18·0	18·0	59·6	0	50	P.Pl.	450 Pr.[1] Br	..	..	16·0	1700 0	$75\frac{8}{16}$ c$112\frac{8}{16}$	0·151	0·415	1540	27,960	350	24·3	22·5	20·9
	12·5-in.	38 tons.	I.	230·0	15·84	Unchambered		0	35	W.	130 Pr.[2] or 165 Pr.[1] Bl	..	..	12·5	818·0	$37\frac{8}{16}$	0·191	0·419	1442	11,820	311	17·4	16·0	14·7
	12·5-in.	38 tons.	II.	222·8	15·84	14·0	41·125	438	35	W.	200 E.X E 210 Pr.[2] or 190 Pr.[1] Bl								1575	14,070	371	19·5	17·8	16·3
	12-in.	35 tons.	I.	195·0	13·54	Unchambered		0	35	W.	110 Pb.[2]	..	..	12·0	714·0	$31\frac{10}{16}$	0·202	0·413	1340	8,890	273	15·5	14·4	13·2
	12-in.	25 tons.	II.	182·5	12·09	”		100	50	W.	85 Pb.[2]	..	..	12·0	614·0	$28\frac{2}{16}$ c$61\frac{10}{12}$	0·235	0·355	1292	7,109	288	13·4	12·1	11·0
	11-in.	25 tons.	II.	180·0	13·18	”		0	35	W.	85 Pb.	..	..	11·0	548·0	27	0·221	0·411	1360	7,028	281	14·2	12·9	11·7
	10-in.	18 tons.	II.	180·0	14·55	”		100	40	W.	70 Pb.	..	..	10·0	410·0	23½	0·244	0·410	1379	5,408	300	13·1	11·7	10·5
	9-in.	12 tons.	V.	156·0	13·89	”		0	45	W.	50 Pb.	13 4	7½	9·0	256·0	17	0·316	0·351	1440	3,681	307	11·4	9·8	8·5
	8-in.	9 tons.	III.	144·0	14·75	”		0	40	W.	35 Pb.	..	..	7·92	179·0	→ $17\frac{12}{16}$	0·358	0·350	1391	2,398	266	9·7	8·2	7·1
	7-in.	90 cwt.	I.	131·0	15·86	”		35	35	W.	22 Pb.	..	..	6·92	114·6	→ $11\frac{1}{16}$	0·428	0·334	1325	1,395	310	7·9	6·5	5·7
	7-in.	6½&7 tons.	III. & IV.	133·0	15·86	”		35	35	W.	30 Pb.	..	..	6·92					1525	1,848	284	9·2	7·2	5·9
	64-pr.	64 cwt.	III.	118·0	15·47	”		40	40	Pl.	10 R.L.G.[4]	..	..	6·28	64·5	→ $8\frac{8}{16}$	0·588	0·271	1390	865	270	..	..	..
	64-pr.	71 cwt.	I.	122·72	16·42	”		40	40	Pl.	8¼ R.L.G.[4]	..	..	6·29	64·5	→ $8\frac{5}{16}$	0·588	0·271	1260	715	201	..	..	..
	40-pr.	35 cwt.	II. L.	120·0	22·0	”		35	35	W.	6¾ R.L.G.[4]	..	..	4·75	38·8	→ $3\frac{6}{16}$	0·582	0·362	1425	546	312	..	..	..
	25-pr.	18 cwt.	I. L.	98·0	22·0	”		35	35	W.	4½ R.L.G.[4]	..	..	3·94	24·96	→ $1\frac{13}{16}$	0·622	0·408	1350	315	350	..	..	..
	16-pr.	12 cwt.	I. L.	78·0	19·0	”		30	30	F.M.	3⅜ R.L.G.[4]	..	..	3·54	16·1	→ $1\frac{2}{16}$	0·771	0·366	1355	205	342	..	..	..
	13-pr.	8 cwt.	I. L.	92·0	28·0	3·15	14·13	100	30	P.	3¼ R.L.G.[4]	..	..	3·0	13·0	$\frac{11}{16}$	0·689	0·484	1595	232	580	..	..	..
	9-pr.	8 cwt.	I. & II.	72·0	21·17	Unchambered		30	30	F.M.	1¾ R.L.G[2]	..	..	3·0	9·1	→ $8\frac{12}{16}$	0·996	0·335	1330	119	298	..	..	..
	9-pr.	6 cwt.	I.	61·0	17·67	”		30	30	F.M.	1½ R.L.G.[2]	..	..	3 0					1250	97	323			
	9-pr.	6 cwt.	II. III. IV.	74·5 74·875	22·0	”		30	30	F.M.	1¾ R.L.G.[2] 1½ R.L.G.[2]	.. ..	.. ..	2·94	9·1		0·956	0·356	1330	119	397	..	..	..
	2·5-in.	100 lbs.	I. & II. L.¶	70·45	26·6	2·56	11·07	80	30	P.	1½ R.L.G.[2] or $1\frac{10}{16}$ R.L.G.	.. ..	.. ..	2·5	7·25	$\frac{4·5}{16}$	0·819	0·488	1440	101	377	..	..	..
	7-pr.	200 lbs.	IV.	41·0	12·0	Unchambered		20	20	F.	¾ R.F.G.	..	..	2·94	7·29	→ $\frac{7·25}{16}$ $1\frac{4·5}{16}$	1·185	0·287	950	46	515	..	..	..
R.B.L. GUN (screw).	7-in.	82 cwt.	..	120·0	14·21	7·2	16·0	37	37	P.	11 R.L.G.[2]	..	..	7·0	91·25 108·3	$8\frac{4}{16}$ $10\frac{5}{16}$	0·537	0·266	1100	909	222	..	..	..
	40-pr.	35&32cwt.	..	121·0 & 120	22·39	4·96	13·5	36½	36½	P.	5 R.L.G.[2]	..	..	4·75	40·7	$2\frac{6}{16}$	0·554	0·380	1160	380	217	..	..	..
	20-pr.	15&13cwt.	..	66·125	14·43	3·94	11·0	38	38	P.	2½ R.L.G.[2]			3·75	21·8	$1\frac{5}{16}$	0·645	0·414	1000	153	203	..	..	..
	12-pr.	8 cwt.	..	72·0	20·458	3·2	8·5	38	38	P.	1½ R.L.G.[2]			3·0	11·25	$\frac{8}{16}$	0·800	0·417	1239	200	299	..	..	..
	9-pr.	6 cwt.	..	62·0	17·5	3·2	7·0	38	38	P.	1⅛ R.L.G.[2]	..	..	3·0	8.56	$\frac{6}{16}$	1·052	0·317	1055	66	220	..	..	..

L., Land service only. * The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c.
† P. means Polygroove; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry; E.O.C., Elswick Ordnance Co.
‡ S.B.C (in column for charge) means Slow-burning Cocoa; P.Bl. stands for Prismatic Black; P.Br. for Prismatic Brown; Pb., Pebble; R.L.G., Rifle Large Grain; L.G., Large Grain; E.X.E., Experimental letter E.
§ For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell. ** Cast steel. ‡‡ Forged steel. †† Double shell. ‖ Shrapnel.
¶ Mountain-service jointed gun. → Studded projectiles. c For steel common shell. d Estimated.
Note.—For 6-in. (Vickers) *see* Q.F. table. There is also under construction a 7·5-in. B.L. gun, firing a 200-lb. projectile, with about 2700 f.s. muzzle velocity. Length, 45 calibres, weight about 17 tons.
a At 60° Fahr. At 80°, V = 2526 f.s. E = 37,600 ft. tons. Perftn. = 40·6 in.

BRITISH RIFLED ORDNANCE—*continued.*

(Compiled from the official "List of Service Ordnance, 1898." Supplemented by subsequent information.)

Ordnance. Nature. Calibre or Pr.	Nature. Weight.	Nature. Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter.	Chamber. Length to base of projectile.	Rifling. Twist one turn in: Least at breech.	Rifling. Twist one turn in: Greatest at muzzle.	Rifling. System.†	Charge (full). Weight.‡	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.§	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^2}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Ballistics. Muzzle energy per ton of gun.	Perforation of wrought iron. At muzzle.	Perforation. At 1000 yards range.	Perforation. At 2000 yards range.
				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.
QUICK-FIRING GUNS										lbs. oz.													
7·5 in.	14 tons	..	349	45	..	..	..	..	..	..	..	..	...	200·0	..	0·281	0·474	2700	10,120	723	27·4	23·0	19·3
6·0 in.	7 tons	I. & III. II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	..	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2
6·0 in. converted ..	5 „	I. to VI.	169·1 166·6	26·2 26·6	.. ..	.. ..	.. ..	.. ..										1913	2537	362	13·0	10·3	8·2
6·0 in. (Vickers) ‡‡ ..	$7\frac{8}{20}$ tons	"BL. VII."	..	45	..	..	..	..	..	..	..	..	..	100·0	..	0·360	0·463	2642	††1840	654	21·0	16·7	13·4
4·7 in.	41 cwt. 42 „	I. II. III. & IV. Wire	194·1	40	..	...	100 0	34·4 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	6·6
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 120	40 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 2177	917 821	705 569	10.5 9·5	6·9 6.5	4·9 4.6
12-pr.	12 cwt.	I.	123·6	40	..	..	120 0	28 30	E.O.C. M.Pl.	..	1 15	10	3·0	12·5	..	0·667	0·500	2210	423	677	8·1	5·3	3·5
12-pr.	8 cwt.	I.	87·6	28	..	..	60 0	28 30	E.O.C. M.Pl.	..	13¾	10	3·0	12·5	..	0·667	0·500	1607	223·8	544	4·9	3·2	2·4
Hotchkiss . 6-pr...	8 cwt.	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	4·8	2·8	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																	
Hotchkiss . 3-pr...	5 cwt.	I. & II.	80·63	40	..	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4.3	2·2	..
MACHINE GUNS.										grains.				oz. grs.									
Nordenfelt, 2 bar 1-in.	180 lbs.	I.	52		..	..	35	35	H.	625 M.G.	..	..	1·0	7¼ 0	..	2·207	0·453	..	..	..	¼-in. at 200 yards.		
„ 4 bar 1-in.	447 lbs.	III.**	57·0		..	..	35	35	H.														
„ 5 bar 0·45-in.	160 lbs.	I. G. G.	46·0		..	..	22	22	H.														
	143 lbs.	II. G. G.	42·25		..	..	22	22	H.														
Gardner, 1 bar 0·45-in.	76 lbs.	I. G. G.	47·0		..	..	22	22	H.	85 R.F.G.$_2$	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as MH. Rifle, which perforates ½ in. wrought iron plate at 600 yds., $\frac{7}{16}$ in. at 400 yds., ¾ in. at 100 yds.		
„ 2 bar 0·45-in.	120 lbs.	I. G. G.	47·0		..	..	22	22	H.														
„ 5 bar 0·45 in.	268 lbs.	I. G. G.	53·5		..	..	22	22	H.														
Gatling, 10 bar 0·65 in.	787 lbs.	..	66·5		..	..	30	30	H.	270 R.F.G.$_2$	..	..	0·65	1422	..	2·109	0·730	..	..	..	Not known.		
„ 10 bar 0·45-in.	402 lbs.	I. G. G.	59·0		..	..	22	22	H.														
„ (Acclesfeed)	266 lbs.	I. G. G.	51·0		..	..	22	22	H.	85 R.F.G.$_2$	..	..											
Maxim, 1 bar 0·45 in. Maxim, converted ·45	63 lbs.	I. G. G.	43·75 45·0 42·38		..	..	22 10 10	22 27 25·6	H. Enfi'ld Metf'd	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as MH. Rifle.		

* L., Land-service only, but might concern navy when serving on land. The Roman numeral is the number of the pattern given. † P. means Polygroove; M.Pl., Modified plain; W., Woolwich; F., French; F.M., French modified; H., Henry; E.X.E., Experimental letter E. § For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell.

** I. and II. differ chiefly in being 7 lbs. lighter; I. has a pitch of rifling of 1 in 60 in.; G.G., Gardner Gatling; H., Henry. *b* With 4 drs. R.F.G. †† With a new gun at Portsmouth and must be regarded as the maximum effect.

‡‡ This gun has no metal cartridge. §§ There is a Gardner and also a Nordenfeldt ·303 bore gun for L.S.

AUSTRIAN NAVAL ORDNANCE.

	Krupp Steel B.L. Guns.											Uchatius. St., Br.					Cast Iron BL.	Q.F. Krupp.				Q.F. Skoda.	
Designation by Calibre, in centimètres	30·5 L. 35 C. 80	26 L. 22	24 L. 35 C. 86	24 L. 22	21 L. 20	15 L. 35 C. 86	15 L. 35 C. 80	15 L. 26 K.Z.	15 L. 26 P.Z.	12 L. 35 C. 80	12 L. 35 C. 87	15 L. 25	15 L. 37	12 L. 35	9 L. 24	7 L. 15	15 L. 21	24 L. 40	15 L. 40	15 L. 35	12 L. 35	15 L. 40	12 L. 40
Calibre, in inches	12·01	10·24	9·45	9·27	8·24	5·87	5·87	5·87	5·87	4·72	4·72	5·87	4·72	4·72	3·43	2·60	5·87	9·45	5·87	5·87	4·72	5·87	4·72
Length — Total, in Feet	35·11	18·77	27·60	17·16	13·73	17·13	17·13	12·63	12·63	13·8	13·8	12·19	14·38	13·97	6·76	3·28	10·13	31·5	19·55	17·13	13·85	19·55	15·78
Length — Rifled Portion, in ins.	314·8	148·4	237·7	135·9	105·0	151·4	153·6	106·8	112·4	128·5	126·3	111·4	123·2	123·8	57·5	23·8	91·1	287·8	182·8	153·6	128·2	182·8	147·9
Length — Powder Chamber "	69·9	46·1	65·2	41·7	37·0	37·3	35·4	28·3	22·6	24·0	26·3	22·8	36·6	31·65	15·3	11·0	15·7	63·8	35 7	35·7	28·5	35·7	28·5
Length — Of bore in calibres	35	19·0	35	22·0	20·0	35	35·0	25·8	25·8	35·0	35	24·9	37	35·0	23·7	15·0	18·4	40	40	35	35	40	40
No. of Grooves	68	32	25	32	30	36	36	24	36	32	32	36	32	32	24	18	30	72	44	44	36	44	36
Twist in calibres	45·25	70	26·9	70	?9	45—25	25	68·4	45	25	25	45	45—25	25	45	30	63·2	25	45·25	45·25	45·25	45·25	45·25
Weight — Gun, tons	47·2	21·7	26·6	14·5	8·68	5·7	4·69	3·94	3·94	2·25	2·31	3·35	3·15	2·85	0·479	0·09	2·81	27·8	4·43	3·75	1·97	4·33	19·7
Weight — Breech Block, in lbs.	3306·9	1951	1776·9	1422	1080	445·3	463·0	321·9	321·9	253·5	211·6	209·4	211·6	211·6	55·1	18·7	176·4	1450·6	328·5	328·5	211·6	291·0	189·6
Weight — Steel Shell "	1003·1	395·7	474·0	292·1	206·6	112·5	86·0	72·8	84·9	57·3	57·3	84·9	57·3	57·3	..	..	..	474·0	100·3	100·3	52·4	100·3	52·4
Weight — Common Shell "	1003·1	354·2	474·0	263·5	172·0	112·5	69·9	67·2 / 65·5	69·4	57·3	57·3	69·45	57·3	57·3	14·02 / 14·22	6·42	6·11	474·0	100·3	100·3	52·4	100·3	52·4
Weight — Shrapnel Shell "	..	..	..	..	..	112·4	71·9	67·2 / 65 5	69·4	57·3	57·3	69·45	57·3	57·3	15·76	6·88	6·79	474 0	100 3	100·3	52·4	100·3	52·4
Weight — Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16·53	6·94	38·4	..	..	..	..	..	..
Weight of Bursting Charge — Steel Shell "	10·6	8·8	5·1	6·6	4·4	1·3	1·76	1·65	2·09	0·55	0·55	2·09	0·53	0·55	..	..	..	5·07	2·0	2·0	1·1	2·0	1·1
Weight of Bursting Charge — Common Shell "	97·7	20·3	17·9	15·0	15·0	5·29	3·86	3·86	5·07	2 2	2·2	5·07	2·20	2·21	0·46	0·18	1·87	4·72	8·82	8·82	4·6	8·82	4·6
Weight of Bursting Charge — Shrapnel Shell "	..	..	..	..	..	1·26	1·10	1·08	1·08	0·57	0·57	1·08	0·57	0·57	0·20	0·09	0·90	..	1.0	1·0	0·53	1·0	0·53
Weight of Firing Charge — Steel Projectile, in lbs.	156·5 24 cm.N	89·3 B	99·2N	76·1 B	50·7 C	22·5 15 cm.N	38·8*	21·6 C	20·9 C	19·8 B	12·13N	20·9 C	30·0 B	19·8 B	..	..	..	91·5	18·3	17·9	9·7	18·3	17·9
Weight of Firing Charge — Common Shell, in lbs.	156·5 N 24 cm.N	59·5	99·2N	44·1	30·9	22·5 15 cm.N	38·8*	14·3 / 21·6 C	20·9 C	19·8 B	12·13N	20·9 C	30·0 B	19·8 B	3·31 / 0·97	0·77 O / 0·35	4·74O						
Weight of Firing Charge — Shrapnel, in lbs.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11·9	11·9	4·6	11·9	4·4
Weight of Firing Charge — Exercising, in lbs.	154·3B	59·5	..	44·1	30·9	28·7	19·6	21·6 C	20·9 C	11·0	6·6 N	20·9 C	19·8 B	12·13 B	3·31	0·77 O / 0·35	4·74O	63·9	11·9	11·9	4·6	11·9	4·4
Weight of Firing Charge — Saluting "	19·8 O	19·8 O	15·4O	15·4 O	8·82 O	4·74	4·74 O	4·74 O	4·74 O	2·4 O	2·4 O	4·74 O	2·4 O	2·4 O	0·88 O	0·35	4·74O				..	..	..
Muzzle Velocity, in feet	1969	1575	2100	1587	1519	2133	1969	1641	1562	1755	2133	1562	1755	1755	1470	978	1017	2264	2264	2133	2133	2264	2264
Muzzle Energy — Total, foot-tons	26,970	6808	14,500	5104	3306	3549	2312	1358	1435	1215	1808	1435	1224	1224	..	..	..	11,850	3565	3163	1617	3565	1856
Muzzle Energy — Per inch circumference, foot-tons	714·8	211·6	488·3	175·3	127·7	192·5	125·4	73·7	77·9	82·5	122·2	77·9	82·45	82·45	..	..	..	567·6	193·3	171·6	111·1	193·3	125·1
Thickness of Iron, perforated inches at Muzzle	28·0§	15·0§	27·4‡	13·7§	11·6§	14·5§	11·7§	8·8§	9·1§	9·4§	11·6§	9·1§	9·5§	9·5§	..	..	..	25·0	14·6	13·7	11·1	14·6	11·7
Ditto by Tresidder's formula.	30·1	14·7	25·8	13·4	..	16·1	12·6	8·9	8 9	9·7	12·9	8·9	9·7	9·7	..	..	..	29·0	17·0	15·5	12·5	17·0	13·7

Note.—C for cube powder; * prismatic powder; O, ordinary powder; B, brown prismatic. N, nitro-glycerine smokeless powder.
‡ By Krupp's formula. § By Fairbairn's formula.
There are also Q.F. Skoda 7 cm., Skoda and Hotchkiss 47 mm., another 47 mm. and Hotchkiss 37 mm.
It is believed that guns with at least 2500 M.V. are under construction.

DANISH NAVAL ORDNANCE.

	Krupp B.L. Guns designated.											Armstrong M.L.					Fins-pong.
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	21 cm.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm. short.	8·6 cm.	10 in.	10 in.	10 in.	9 in.	8 in.†	6 in.
Calibre, in inches	13·98	12·01	10·24	10·24	8·24	5·91	5·91	5·91	4·72	4·72	3·43	10·0	10 in.	10 in.	9·0	8·0	6·04
Total length, in feet	29·1	22·0	32·8	18·77	24·04	17·1	12·63	10·7	11·8	9·6	6·9	17·0	14·5	14·0	13·0	10·8	9·5
Length of Bore, including Powder Chamber, in inches	304·7	227·2	327·6	194·5	264·5	190·3	135·0	112·9	128·8	102·4	73·6	175·5	145·5	140·0	125·0	101·2	100·8
Length of Bore, including Powder Chamber, in calibres	21·8	18·9	32·0	19·0	35	32·2	22·8	19·1	27·3	21·7	21·3	17·5	14·55	14·0	13·3	13·1	16·7
Number of Grooves	80	68	60	60	48	36	36	36	32	32	24	7	7	7	6	6	6
Twist of Rifling, in calibres	45	45	70–25	45	70–25	70–25	45	45	25	40	45	40	40	40	40	50	40
Total weight, including Breech-gear, tons	51·3	35·4	27·6	21·6	13·3	4·7	4·4	3·5	2·13	1·39	0·49	20·0	18·5	18·0	12·5	8·65	2·46
Weight of Breech Block, lbs.	4695·8	2910	2006	1940	903·9	390·2	330·7	324·1	229·2	176·4	101·4	..	..	..	..	..	..
Weight of Steel Shell, "	1157·4	725·3	451·9	451·9	238·1	112·4	..	86·0	..	44·1	..	400	400	400	..	..	..
Weight of Chilled Shell, "	1157·4	725·3	..	451·9	..	..	86·0	86·0	..	44·1	..	400	400	400	250·2	165·3	..
Weight of Common Shell, "	1157·4	725·3	451·9	451·9	238·1	112·4	69·4	69·4	57·3	36·2	15·2	400	400	400	250·2	131·2	55·1
Weight of Shrapnel Shell, "	1157·4	725·3	451·9	451·9	238·1	112·4	86·0	86·0	57·3	44·1	..	..	..	..	..	..	15·4
Weight of Case Shot, "	..	..	..	..	..	..	..	..	..	..	..	191·8	..	..	154·3	127·9	58·4
Weight of Bursting Charge, Common Shell, "	57·3	39·7	25·4	25·4	12·8	6·2	3·0	3·0	1·7	1·4	0·44	26·5	26·5	26·5	18·5	7·5	5·0
Weight of Firing Charge, Steel or Chilled Shell, lbs.	330·7	180·2	191·8	101·4	105·8	41·9	19·3	21·8	17·4	8·8	..	71·7	71·7	71·7	44·1	29·8	..
Weight of Firing Charge, Common Shell, "	330·7	180·2	191·8	112·4	105·8	41·9	19·3	21·8	17·4	8·8	3·3	71·7	71·7	71·7	44·1	19·8	60·6
Muzzle Velocity, Armour-piercing Projectile, feet	1762	1675	2018	1640	2021	1800	1565	1542	..	1416	..	1457	1368	1368	1368	1378	..
Muzzle Velocity, Common Shell, "	1762	1675	2018	1640	2021	1890	1683	1690	1720	1549	1457	1457	1368	1368	1368	1320	1076
Muzzle Energy, Total foot-tons	24910	14110	12770	8428	6745	2784	1461	1418	..	6130	..	5889	5192	5192	3246	2177	..
Muzzle Energy, Per inch circumference, foot-tons	568·3	374·1	396·8	262·0	260·6	150·0	78·7	73·0	..	32·8	..	189·0	165·3	165·3	115·8	86·9	..
Perforation at Muzzle, in ins. by Fairbairn's forma.	24·8	20·0	20·1	16·7	16·9	12·8	9·1	8·8	..	5·8	..	14·1	13·1	13·1	10·9	9·5	..
ditto ditto Tresidder's forma.	25·6	20·1	22·9	16·8	18·5	15·6	12·6	..	..	..	..	..	..	..	..	..	..

NOTE.—Chilled projectiles will gradually be replaced by steel. † There is another Armstrong gun differing very little from this one.
Krupp has supplied 12-cm. and 8·7-cm. Q.-F. guns, and Bofor's Q.-F. piece have been adopted and manufactured.
No more of these guns will be made; the most recent guns have undoubtedly higher velocity.

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading.							Armstrong Muzzle Loading.			Dutch Breech Loading.		
Designation by Calibre, in centimètres	28	21	17	15 No. 1.	No. 2.	12 No. 1.	12	28	23	18	12 No. 2.	12	7·5
Calibre, in inches	11·02	7·91	6·80	5·87	5 87	4·72	4 72	11·00	9·00	7·00	4·72	4·72	2·95
Total Length, in feet	20·01	24·04	13·94	12·63	17·13	6·89	13·78	14·42	13·00	11·00	6·89	13·78	7·87
Length of Rifled Portion of bore, in inches	170·8	222·2	112·7	111·8	151·4	61·4	128·5	119·0	104·0	95·5	61·4	..	43 2
Length of Powder Chamber ,,	36·4	42·4	36·0	23·2	37·7	13·0	24·0	26·0	21·9	15·5	13·0	..	6·7
Length of bore, in Calibres	18·8	35	21·9	23·0	35	15·8	35	12 1	14·0	15·9	15·8	35	17·5
Number of Grooves	64	48/61	42	36	44	12	32	9	6	3	12	32	20
Depth of Grooves, inches	0·069	0·059	0·118	0·118	..	0·049	..	0·20	0·18	0·18	0·118	0·06	0·049
Twist of Rifling in Calibres	45	∝ 25	45	40	25	40	25	∝ 45	∝ 45	35	40	∝ 45	∝ 30
Total Weight, in tons	27·21	12·79/13·98	5·51	3·94	4·72	0·79	2·26	24·46	12·50	7·17	0·93	2·31	0 21
Firing Charge — Armour-piercing Projectile, in lbs.	121·3	99·2	27·6	20·9	49·6	..	19·8	86·0	50·7	30·0	..	19·5	..
Firing Charge — Common Shell ,,	121·3	99·2	27·6	20·9	49·6	2·43	19·8	86·0	50·7	13·9	2·43	19·8	0·82
Weight — Armour-piercing Projectile ,,	560·0	308·6	132·3	86·0	112·2	41 0	57·3	533·5	249·1	114·6	..	57·3	..
Weight — Common Shell ,,	476·2	308·6	112·4	69·4	112·2	29·5	57·3	535·7	262·4	116·8	29·5	57·3	9·5
Weight — Case Shot ,,	273 4	..	63·9	41 9	..	26·5	57·3	185·2	149·9	68·3	26 5	..	9·3
Bursting Charge — Armour-piercing Projectile ,,	6·6	4·6	2·2	1·1	..	0·44	..	4·4	2·2	2·2	..	..	..
Bursting Charge — Common Shell ,,	26·5	12 3	6·6	6·6	..	2·0	..	28·7	17·6	8·8	1·3	..	0·44
Muzzle Velocity, feet	1558	1739	1558	1558	2001	971	1755	1332	1476	1558	951	1804	958
Muzzle Energy — Total, in foot-tons	9423	6471	2226	1447	3115	..	1224	6563	3763	1929	..	1264	..
Muzzle Energy — Per inch Circumference, foot-tons	272	260·7	104	84	169·0	..	82·5	191	134	89	..	85·2	..
Perforation at Muzzle, in inches	17·0	16·8 / 17·1†	10·5	9·1	13·6 / 14·8†	..	9·4 / 10·1†	14·0	11·9	9·7	..	9·6	..
Metal employed or system of construction	Steel Jacket and Hoops.		Steel-hooped.		Steel Jacket and Hoops.	Steel-hooped.	Steel Jacket and Hoops.	Steel Tube and Wrought Iron.			Bronze.		

NOTE.—The 23-cm. ML. guns also discharge 113-Kg. (249·1 lbs.) steel shells and 113-Kg. solid shot. The 18-cm. ML. guns discharge steel shells of 51-Kg. (112·4 lbs.) and segment shells of 53-Kg. (116·8 lbs.). The 7·5-cm. BL. guns discharge ring-shells of 4·3 Kg. (9·5 lbs.). Of the older guns there are yet extant three sorts—rifled 16-cm. muzzle-loader (mostly bronze), and rifled bronze 7-cm. and 5-cm.

† By Tresidder's formula.

The newer ships have undoubtedly more powerful guns, including 9·4-in., 8·2-in., 5·9-in., and 4·7-in. Q.Fs.

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1893.					Model 1887.				1870–81.	70–81. 70–84.	1884.					1881.									
Desig. by Calibre, in cms.	34·0	30·5	27·44	24·0	19·4	34	30·5	27	19	27	32	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14	10	mm. 90	mm. 65
Calibre, in inches	13·39	12·0	10·8	9·45	7·64	13·39	12·0	10·80	7·64	10·80	12·6	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46	3·94	3·54	2·57
Total length, in feet	..	..	..	..	..	..	..	..	..	23·97	27·93	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3	8·6	7·1	3·58
Length of Bore, in inches	..	..	..	..	..	..	..	..	..	269·0	313·8	..	..	..	..	..	380·6	280·2	306 9	269·3	180·9	180·9	162·6	102·6	77·9	41·2
Length of Bore, in calibres	35	40	45	40	40	42	45	45	45	25	25	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28	26	22	16
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42	30	28	20
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	0·059	0·059	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035	0·028	0·024	0·020
Rifling Twist	..	..	..	..	..	..	..	..	..	7°	7°	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°	7°	7°	8°
Total weight, in tons	52·9	45·9	34·9	22·4	10 6	60·0	49·2	37·1	10·6	24·6	42·3	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2	1·18	0·54	0·09
Weight of Firing Charge: Armour-piercing Projectile lbs.	220·5	198·4	114·6	110·2	44·1	220·5	198·4	114·6	44·1	154·3	282·2 249·1	388·0	200·6	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..	..	..	..
Weight of Firing Charge: Common Shell „	..	..	..	..	..	..	..	..	..	154·3	282·2 249·1	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1	9·9	3·6	0·79
Weight: Armour-piercing Projectile* lbs.	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	476·2	760·6	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..	..	..	..
Weight: Common Shell „	..	..	..	..	..	..	..	..	..	396·8	630·5	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1	30·9	17·6	5·95
Weight: Case Shot „	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	130·7	130·7	61·7	39·0	19·5	7·7
Muzzle Velocity, in ft.-sec.	2400	2625	2625	2625	2625	2560	2625	2625	2625	1887	1985 1804	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936	1673	1493	1135
Muzzle Energy: Total, in foot-tons	36850	30750	22750	15170	7898	42040	30750	22750	7898	11760	20780 17160	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..	..	..	..
Muzzle Energy: Per in. circ., foot-tons	..	815·8	670·7	511·1	329·1	..	815 8	670·7	329·1	346·6	525·0 433·5	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..	..	..	..
Perforation at Muzzle, inches	36·8†	37·3†	33·7†	29·4†	13·4†	40·8†	37·3†	33·7†	23·7†	20·6†	26·1† 22·6†	27·6†	22·0†	19·2†	13·0†	10·7	27·6†	24·2†	22·0†	19 2†	13·0†	11·6†	..	..	..	..
„ „ „	..	..	..	..	..	..	..	..	..	..	..	26·6‡	21·1‡	18·4‡	12·4‡	..	26·6‡	..	21 1‡	18·4‡	..	..	..	..	..	..

* Steel or chilled iron. † By Tresidder's formula ‡ By Krupp's formula.

NOTE.—M. Clandinon stated in March, in the French Chamber of Deputies, that France has a 12-in. (30·5 cm.) gun with a muzzle energy of 12,200 metre tons or 39,395 ft. tons. This for a projectile of 643·8 lbs. implies a velocity of 2971 f.s.

FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	75–79.	Jacketed. 1870.		Jacketed.		1875.				1870.					Q.-F. Guns.						
				75	75										16§	16‡	14§	14	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.	37	27	14	27 No. 1	10	42†	34	27 No. 1	10	27	24	19 long.	16	14	16·47		13·86		10·(0		
Calibre, in inches	14·57	10·79	5·46	10·8	3 94	16·54	13·39	10·8	3·91	10·8	9·45	7·64	6·49	5·46	6·46		5·44		3·94		
Total length, in feet	36·7	17·7	10·3	19·3	9·3	32·5	22	19·3	9·3	17·7	16·21	13·6	12·2	10·3							
Length of Bore, in inches	414·0	194·3	115·0	213·4	104·3	366·0	241·5	213·4	104·3	194·3	179·1	151·0	137·3	115·0							
Length of Bore, in calibres	28·5	18	21	19·7	26	22	18	19·8	26	18·0	19	19·7	19	21	45	30	45	30	60	50	26
Number of Grooves	..	54	28	54	20	84	68	54	20	54	48	28	50	28							
Depth of Grooves, inches	0·079	0·059	0·047	0·059	0·032	0·079	0·059	0·059	0·032	0·059	0·059	0·059	0·039	0·017							
Rifling Twist	7°	4°	4°	4°	7°	7°	4°	4°	7°	4°	4°	4°	7°	4°							
Total weight, in tons	**75·1	22·8	2·6	27·9	1·18	74·8	47·6	27·6	1·18	22·8	15·4	7·9	4·92	2·66	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge { Armour-piercing Projectile * . . lbs.	463	136·7	..	165·3	..	604·1	304·2	136·7	..	92·6	62·8	33·1	39·7	..	30·2	19·0	16·1	12.8	8·16	8·16	5·07
Weight of Firing Charge { Common Shell . ,,	463	126·8	11·2	145·5	10·1	..	231·5	121·3	7·1	92·6	62·8	33·1	39·7	9·0							
Weight { Armour-piercing Projectile . . lbs.	1235	476·2	..	476·2	..	1719·6	925·9	476·2	..	476·2	317·5	165·3	99·2	..	99·21		66·14		30·87		
Weight { Common Shell . ,,	1014	396·8	61.7	396·8	30·9	1433·0	771·6	396·8	26·3	396·8	264·6	137·8	99·2	46·3							
Weight { Case Shot . . ,,	..	321·9	42·8	321·9	18·7	..	..	321·9	18·7	321·9	211·6	..	68·3	39·7							
Muzzle Velocity, in ft.-sec.	1969	1603	1529	1640	1673	1663	1722	1641	1591	1424	1444	1470	1782	1332	§2625	2100	2625	2100	2500	2428	1840
Muzzle Energy { Total, in foot-tons	33210	8515	..	8880	..	17750	19160	8865	..	6695	4592	2477	2183	..	4730	3061	3160	2022	1240	1266	725
Muzzle Energy { Per in. circ.. foot-tons	725·4	251	..	261·7	..	422	456	261	..	197·3	154·7	103·2	107	..	233·5	150·9	184·9	118 7	..	..	..
Perforation at Muzzle, inches	30·5†	16·2†	..	16 7†	..	26·3†	22·6†	16·7	..	20·53	20·3	10·4	10·8	..	20·0†	14·4†	17 7†	12·7†	13·0†	12·5†	8·2

* Steel or chilled iron.
‡ Models 1881 and 1884 converted guns.
** Made at St. Chamond. The Creusôt gun weighs 71·4 tons.
§ There are three models of the years 1887 1891 and 1893, of slightly different weight from the above. A gun of model 1896 is said to have M.V. 2870 f.s. Pen., 23 inches of iron.
† By Tresidder's formula.

GERMAN NAVAL ORDNANCE.

	Krupp Steel Breech-loading Guns, designated by calibre.																					Bronze B.L.
Designation in centimètres	30·5 jack'd.	28	28	26 long.	26 jack'd.	26 short.	24 long. **	24 long.	24 long.	24 short.	21 long.	21 long.	17 long.	15 long.	15 short jack'd.	15 short.	15 short jack'd.	12·5 hoop'd.	10·5 long.	8·7	6¶	8
Calibre, in inches	12·01	11·02	11·02	10·33	10·33	10·33	9·45	9·45	9·45	9·37	8·24	8·24	6·80	5·87	5·87	5·87	5·87	4·92	3·96	3·43	2·36	3·19
Length: Total, in feet	21·98	36·75	32 15	18·77	18·77	17·06	31·50	27.56	23·63	15·45	24·0	20·61	13·94	14·67	10·73	10·73	10·68	9·60	12·08	6·89	4·1	5·15
Length: Rifled portion, in ins.	181·9	§407·9	§352·8	149·8	150·0	129·3	349·6	302·4	201·6	116·2	218·2	176·5	117·1	128·5	93·3	87·1	87·1	85·7	113·6	62·7	44·3	45·9
Length: Powder Chamber†, ,,	45·3			44·7	44·4	44·7	..	..	53·5	40·9	75·3	46·7	31·5	31·1	19·0	25·1	25·1	16·7	19·5	10·7	..	9·73
Length: Bore, in calibres	18·9	40	35	18·8	18·8	16·8	..	..	26·1	16·8	35·6	27·1	21·9	27·2	19·1	19·1	19·1	20·8	33·6	21·4	..	17·4
Number of Grooves	72	..	..	36	48	36	..	..	56	48	48	48	30	36	36	36	36	32	32	24	24	12
Depth of Grooves, in inches	0·079	..	..	0·077	0·079	0·077	..	..	0·059	0·061	0·059	0·059	0·063	0·059	0·061	0·061	0·061	0·059	0·049	0·049	..	0·051
Twist, in calibres	45	..	..	50	50	50	..	..	25*	45	25*	25*	45	25*	45	45	50	40*	25*	40*	..	46
Weight: Gun, including Breech Gear, tons	35·4	43·4	43·2	21·7	18·7	17·7	25·4	21·7	18·7	14·6	13·03	12·3	5·51	4·04	3·44	3·44	3·15	1·38	1·15	0·44	0·10	0·23
Weight: Breech Block, in lbs.	2954	..	..	2050	1973	1973	..	..	..	1378	831·1	908·3	496·0	390·2	324·1	324·1	324·1	163·1	149·9	86·0	..	55·1
Weight: Armour-piercing projectile,‡ in lbs.	725·3	562·2	562·2	412·3	412·3	412·3	474·0	474·0	474·0	306·4	308·6	308·6	117·9	112·4	76·1	76·1	76·1	..	..	..	..	..
Weight: Common Shell, in lbs.	725·3	474·0	474·0	357·1	357·1	357·1	474·0	474·0	474·0	261·5	308·6	308·6	112·9	112·4	65·0	65·0	65·0	40·1	39·7	14·9	6·61	8·3
Weight of Bursting Charge: Armour-piercing Shell, in lbs.	7·7	..	..	5·3	5·3	5·3	7·05	7·05	6·6	3·2	5·5	5·5	1·3	1·5	0·8	0·8	0·8	..	..	..	..	..
Weight of Bursting Charge: Common Shell, in lbs.	19·8	25·4	25·4	14·3	14·3	22·0	16·5	16·5	15·4	15·4	12·1	12·1	5·1	4·3	4·2	4·2	4·2	2·4	0·9	0·4	..	0·6
Weight of Firing Charge: Armour-piercing Shell, in lbs.	202·8	352·7	297·6	105·8	105·8	125·7	..	..	152·1	67·2	103·6	103·6	30·9	33·1	14·3	17·1	17·1	..	..	..	..	..
Weight of Firing Charge: Common Shell, in lbs.	202·8	352·7	297·6	105·8	105·8	125·7	..	..	152.1	50·7	103·6	103·6	30·9	33·1	14·3	17·1	17·1	8·8	8·8	3·3	0·88	0·9
Initial Velocity: Armour-piercing projectile, ft.-sec.	1713	2362	2133	1588	1588	1578	2067	1903	1657	1493	1739	1657	1608	1624	1463	1463	1463	..	..	..	..	..
Initial Velocity: Common shell, ft.-sec.	1713	..	..	1641	1641	1654	2067	1903	1657	1391	1739	1657	1654	1624	1555	1555	1555	1545	1526	1545	1545	1053
Muzzle Energy: Total, foot-tons	14,750	21,750	17,740	7211	7211	7119	14050	11910	9024	4736	6471	5876	2112	2055	1131	1131	1131	..	..	..	..	..
Muzzle Energy: Per in. circ., ft.-tons	391	628·4	512·4	223	223	220	473·3	401·2	304	161	250·0	227	98·9	111·5	61·3	61·3	61·3	..	..	..	..	..
Perforation at Muzzle, in ins.	20·5	‖30·7	‖26·3	15·4	15·4	15·3	‖26·8	21·0	18·1	13·0	16·4	15·6	10·3	11·0	8·0	8·0	8·0	..	..	..	..	..
Ditto by Tresidder's formula	20·8	30·6	26·7	15·1	15·1	15·0	25·3	22·2	18·0	..	16·8	15·6	10·2	..	..	..	..	..	..	..	..	..

NOTE.—There are also quick-firing guns; see Table of Krupp Q.-F. guns, but M.V. does not probably exceed 2400 to 2500f.s. *Maximum twist. †Including taper entrance into bore. ‡ In most cases steel shells. § Length including powder chamber. ‖ Iron by Krupp's formula. ¶ Boat gun for landing and working ashore. ** The 9·45 Q.-F., which is being mounted in all the latest ships, probably has M.V. about 2500f.s. Pen.: 33·5" and 25¼ at 2000 yds.

ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.				B.L.	Armstrong Muzzle Loading.							Muzzle Loading. Old Pattern.		Breech Loading.		Armstrong Quick Firing.			
Designation by Calibre, in centimètres	43·1‡ New Pattern.	43·1‡ Early Pattern. 1882.	34·3	12·0	12·0	45·0	27·9 New Pattern.	25·4 No. 1 Long.	25·4 No. 2 Short	25·4 No. 2.	22·8	20·3	16	16	7·5 No. 1.	7·5 No. 2.	15·2†	14·9	12·0*	12·0§
Calibre, in inches	17	17	13·5	4·72	4·72	17·72	11	10	10	10	9	8	6·5	6·5	3	3	6·0	5·87	4·7	4·7
Length: Total, in feet	40·75	39	36·09	8·5	9·25	32·7	14·4	14·4	14	13·8	13·8	10·8	11·8	10·6	5·8	3·3	13·8	13·87	16·2	13·0
Length: Rifled Bore, in inches	346·8	315·7	..	75	88	302	121	120	114	112	106	89	96	87	52	27	126	..	189	..
Length: Powder Chamber, in inches	84·5	98	..	10·8	22	56·5	24·5	26·0	26·0	14 0	19·5	15·7	21·3	21·3	10·2	7·9	28	..		..
Length: Bore, in Calibres	27	26	..	20·2	23·5	20·5	13·2	14·6	14·0	12·6	13·9	13·1	16·8	15·5	20·7	11·7	26	..	40	35
No. of Grooves	82	82	56	37	36	28	9	7	7	8	6	6	6	6	12	12	28	28	22	22
Twist of Rifling, in Calibres	50	50	..	40	42	50	35	40	40	55	45	45	42·5	27·3	48	48	40	40	34·4	..
Total Weight, in tons	104·3	101·5	67·9	1·20	1·38	100	25·0	18·0	18·1	12·1	12·6	6·99	5·12	3·54	0·29	0·095	4	4·2	2·05	1·69
Firing Charge: Armour-piercing projectile, lbs.	900·0	725	630·5	5·5	9·9	551	95·2	77·6		63·9	59·7	37·7	19·8	..	..	..	39 7	26·5	12·0	..
Firing Charge: Common Shell, „	600	480	..	5·5	9·9	63·0	66·6	52·9		41·9	37·7	26·7	7·3	7·1	1·9	0·7	26·5	40	12·0	..
Weight: Armour-piercing projectile, „	2000	2000	1250	52·0	52·2	2000	540·1	451·9		331·8	315·3	191·8	103·6	..	..	..	80		45·0	36·0
Weight: Common Shell, „	2000	2000	1250	31·7	36·8	2000	526·9	399·0		284·4	250·0	180·0	64·6	65·7	9·4	9·4	80	about 80·0	..	36·2
Weight: Shrapnel „ „	2017	2017	1250	37·3	37·37	2180	533·5	399·0		284·4	250·0	180·0	68·3	..	9·4	9·4	80		..	29·8
Weight: Case Shot „	..	..	..	32·4	35·9	..	200·1	188·1		135·6	99·6	79·4	33·1	33·1	9·0	9·0	70	..	..	..
Bursting Charge: Armour-piercing projectile, „	32	32	17·4	2·31	2·31	32 ?	15·0	12·3		8·4	6·5	3·8	..	..	..	..	1·5	..	..	1·83
Bursting Charge: Common Shell, „	60	60	87·1	2·2	2·2	78 ?	26·0	23·8		18·2	18·8	9·7	2·87	2·87	0·31	0·31	5	..	..	3·02
Bursting Charge: Shrapnel „ „	5	5	4·25	0·35	0·35	5 ?	2·2	2·20		1·96	1·80	1·17	0·55	..	0·03	0·03	0·16	..	..	0·35
Muzzle Velocity, in feet	1992	1935	2016	1345	1591	1700	1353	1388		1373	1284	1311	1290	1024	1335	..	1946	..	1786	..
Muzzle Energy: Total, foot-tons	55,030	51,930	35,230	650·4	916·4	40,060	6857	6035		4369	3604	2286	1195	..	..	..	2100	..	995·4	..
Muzzle Energy: Per inch circumference, foot-tons	1035	976·3	830·8	43·9	61·8	753·4	198·5	192·2		139·1	127·6	91·0	58·5	..	..	..	114·1	..	67·1	..
Perforation at Muzzle, inches of iron	33·7	32·8	30·2	6·7	8·1	27·8	14·3	14·1		12·0	11·4	9·6	7·7	..	..	..	**11·4	..	**8 8	..
„ by Tresidder's formula	36·7	35·0	33·0	..	8·3	28·2	..	..		..	..	..	..	..	..	..	11·8	..	9·2	..
Metal employed in structure	St.	I. & St.		St.	St.	Steel tube in Wrought Iron jacket.							I. & St.	Cast I.	Br.	Br.			St.	

St. stands for steel, I. for iron, Br. for Bronze.

* For Piemonte. ** By Krupp's formula. † For Piemonte, Fieramosca, Re Umberto, Ancona, Doria.

‡ There are four types of these bores, viz.—types Lauria, Lepanto, Italia, Valente. § For Duilio, Dandolo, Formidabile. The Piemonte has a 40-calibre gun.

Note.—See also Table of Elswick Quick-Firing Guns. Ships built since 1899 probably have guns with about 2500f.s. M.V.

RUSSIAN NAVAL ORDNANCE.

	Obukhoff Steel Breech Loading Hooped Guns.															Steel B.L. Guns.		
Designation by Calibre, in inches.	12	12 Long.	12 M. 77.	11 M. 67.	11 Pattern 77.	9	9 a M. 67.	9 b	8	8	8 M. 67.	6 Long.	6	6·03	6	Long 9-pdr.	4·2 9-pdr.	3·43 Long 4-pdr.	3·43 4-pdr.
Calibre in centimètres	30·48	30·48	30·48	27·94	27·94	22·86	22·86	22·86	20·32	20·32	20·32	15·24	15·24	15·32	15·24	10·67	10·67	8·70	8·70
Total Length, in feet	**35	30	20	18·3	20·0	**26·25	15·0	13	**23·33	**20	14·6	**17·5	14	12·2	11·7	6·9	7·0	6·9	5·8
Length of Rifled Portion of Bore, in inches	..	..	165·0	152·0	158·0	..	124·0	..	..	..	128·0	..	118·7	106·0	98·0	61·5	65·0	62·6	53·0
Length of Powder Chamber, in inches	..	..	38·5	35·0	50·4	..	28·5	..	..	..	23·0	..	30·5	22·4	22·2	10·5	8·0	10·7	..
Length of Bore in calibres, including Powder Chamber	**35	..	17	17	18·9	**35	16·9	..	**35	**30	18·9	**35	24·9	21·3	20	17·1	17·4	21·4	..
Number of Grooves, in ins.	..	..	36	36	64	..	32	32	..	..	30	..	..	24	24	24	16	24	12
Depth of Grooves in ins.	..	0·070	0·135	0·135	0·135	..	0·110	0·110	..	..	0·090	..	0·060	0·085	0·070	0·055	0·055	0·050	0·050
Twist of Rifling in cals.	..	..	73·5	70	..	..	60	60	..	..	70	..	*24	60	68	*40	50	40	41
Total Weight, in tons	55·7	50·45	39·9	28·2	28·2	19·44	15·0	12·5	13·64	12·74	9·65	6·26	4·08	4·35	4·03	0·60	0·87	0·45	0·35
Weight of Steel Shell, in lbs.	..	..	665·8	515·9	..	..	249·1	275·6	..	..	172·0	..	90·9	97·6	86·0	..	..	..	..
Weight of Chilled Shell, „	..	731·9	665·8	515·9	562·2	..	275·6	264·7	..	193·1	169·8	..	119·0	86·0	86·0	..	..	..	..
Weight of Common Shell, „	626·4	..	639·3	496·0	520·3	268·2	266·8	266·8	192·3	172·4	172·0	73·35	..	81·6	81·6	27·6	24·2	15·2	12·6
Weight of Case Shot, „	..	..	293·2	216·1	..	..	176·4	176·4	..	..	134·5	..	..	57·3	57·3	27·6	22·3	15·2	11·0
Weight of Firing Charge, Steel Shell, „	..	..	144·4	115·3	..	..	64·2	47·0	..	..	31·5	89·38	..	14·3	18·1	..	..	..	..
Weight of Firing Charge, Chilled Shell, „	..	246·9	144·6	90·6	132·2	..	47·0	47·0	..	72·0	29·3	39·6	37·8	14·3	18·1	..	..	..	..
Weight of Firing Charge, Common Shell, „	..	..	117·3	81·6	132·2	180	42·1	42·1	88·2	72·0	28·4	39·6	..	10·8	14·3	4·5	2·6	3·1	1·3
Muzzle Velocity, in feet	..	1942	1470	1486	1516	2376	1463	1260	1925	1796	1352	2080	‡1739	1206	1463	1225	..	1444	..
Muzzle Energy, Total, foot-tons	..	19140	9974	7903	8960	10500	4095	3035	..	4321	2180	2682	1905	982	1276	..	..	..	..
Muzzle Energy, Per Inch Circumference, ft.-tons	..	508·4	264·6	228·8	259·3	371·4	144·7	107·4	..	172·0	86·7	142·3	101·1	51·8	67·74	..	..	..	..
Perforation at Muzzle, in inches	..	23·6	16·7	15·5	16·5	20·2	12·3	10·5	..	13·5	9·5	12·50	10·5	7·2	8·4	..	..	..	..
Perforation at Muzzle, by Tresidder's formula	..	25·3	..	..	..	†24·0	..	..	†15·7	†14·2	..	..	†12·2	..	..	..	..	..	..

NEW PATTERN RUSSIAN NAVAL GUNS.

The following guns are in use in the Russian Navy, the ballistics being somewhat as under :—

	12-in.	10-in.	9-in.	8-in.
Length	40 cals.	45 cals	45 cals	45 cals.
Projectile	720 lbs	488 lbs	403 lb.	188 lbs
Muzzle Velocity	2600f.s	2600f.s	2500f.s	2800f.s
Perf. Wt. Ir. Muzzle	38 ins.	35 ins.	32 ins.	27 ins.
Perf. Wt. Ir. 2000 yds.	30 „	27 „	24 „	20 „

Q.F. GUNS.

	6-in.	4·7-in.	13-pdr.
Length	45 cals.	95 cals	45 cals.
Projectile	89 lbs.	46 lbs.	13 lbs.
Muzzle Velocity	2700 f.s.	2600 f.s.	2430 f.s.
Perf. Wt. Ir. Muzzle	20½ ins.	15½ ins.	9¼ ins.
Perf. Wt. Ir. 2000 yds.	12 „	9 „	4 „

** It is doubtful if this refers to the total length of gun or of bore. * Maximum of increasing twist. † The weight of the projectile is uncertain.
‡ With pyroxiline. *a* New. *b* Converted. There exist also 15 and 10·7-cm. Krupp guns.

SPANISH NAVAL ORDNANCE.

	Hontoria, Pattern 79.				Hontoria, Pattern 83.								Armstrong, Pattern 83.				Armstrong.			Krupp.				Converted.			Garcia de Loma.
	B.L.				Breech Loading.												Muzzle Loading.		Pattrn. 81 B.L.	Breech Loading.				Q.F. guns.			Q.F.
Designation by Calibre	18-cm	16-cm. No. 1.	16-cm No. 2.	16-cm No. 3.	32-cm.	28-cm.	24-cm.	20-cm.	18-cm	16-cm.	14-cm	12 cm.	15-cm.	12-cm.	8·7-cm	7·5-cm long.	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	8·7-cm	7·5-cm	14-cm. M. 83	12-cm. M. 83	7-cm. M. 79	10-cm
Calibre, in inches	7·09	6·30	6·30	6·30	12·60	11·02	9·45	7·87	7·09	6·34	5·51	4·72	6·00	4·72	3·4	2·95	9·00	8·00	6·00	5·87	4·72	3·43	2·95	5·51	4·7	2·76	3·9
Length: Total length, in feet	15·57	13·8	9·50	9·65	38·7	33·8	29·0	..	21·75	19·3	16·91	14·5	16·97	13·75	7·9	7·50	13·0	11·0	14·5	17·13	11·81	6·9	6·6	17·4	..	3·71	18·2
Length: Rifled Portion, in inches	141·2	125·6	83·1	..	352·4	309·1	..	..	..	170·6	149·1	126·0	158·3	135·8	75·0	70·7	104·0	102·0	126·9	..	..	..	57·6	..	..	..	..
Length: Powder Chamber, in inches	..	31·9	17·3	..	86·8	77·1	..	..	..	49·8	53·9	39·4	31·4	19	13	13	..	..	29·7	..	..	..	..	..	..	..	..
Length: Bore, in calibres	..	25	17	..	50	50	30	..	30	35	35	35	32	33	27	28·7	14	14·75	26·1	35*	30*	24*	25·8*	..	..	..	..
No. of Grooves	42	38	3·8	..	80	70	60	50	45	40	35	30	28	22	20	18	6	4	28	36	32	24	24	..	..	..	..
Depth of Grooves, in ins.	0·06	0·06	0·06	..	0·06	0·06	0·05	0·06	0·04	0·04	0·04	0·04	0·037	0·03	0·03	0·03	0·18	0·18	..	0·06	0·06	0·05	0·05	..	..	..	..
Twist of Rifling, in cals.	Increasing from 10 to 40.		56	..	From 0 to 30.								30	40	30	35	45	40	100 to 40	25	25	40	36	..	..	..	..
Total Weight, in tons	7·87	5·6	48·0	..	47·3	32·5	20·7	11·5	8·71	6·1	4·1	2·6	5·0	2·2	0·45	0·35	12·0	9·0	4·0	4·7	2·1	0·44	0·30	4·23	..	0·98	1·67
Weight: Armour piercing projectile, in lbs.	135·6	93·7	93·7	..	1041	694·3	438·7	253·5	187·4	130·1	86·0	53·1	97·0	39·2	..	..	250·0	180·0	78·3	84·9	43·65	..	..	‡154·3	‡112·4	..	32·4
Weight: Common Shell, in lbs.	113·8	83·6	83·6	..	879·6	586·4	370·4	213·8	..	112·4	75·0	47·2	92·6	36·4	14·1	11·5	250·0	180·0	73·6	65·5	34·61	14·6	9·48	‡145·5	‡108	7·3	28·2
Weight: Ring Segment, in lbs.	..	83·8	83·6 / ..	63·9 / 63·9	886·3	590·8	370·4	211·6	..	112·4	75·0	47·6	..	38·6	15·4	11·7	..	..	83·6	..	34·61	14·6	9·04	‡145·5	‡108	8·2	28·7 / 17·2
Firing Charge: Armour-piercing projectile, in lbs.	..	26·5	..	15·4	485·0	352·7	220·5	112·4	94·8	66·1	44·1	28·7	48·5	16·0	..	..	50·0	35·0	34·0	37·48	19·29	..	..	..	..	..	17·2
Firing Charge: Other projectiles	..	24·3	..	15·4	463·0	319·7	220·5	..	..	61·7	..	28·7	30·0	11·9	4·0	4·0	33·0	21·0	24·9	25·4	..	10·3	10·4	..	..	..	..
Muzzle Velocity, in feet	..	1631	1493	..	2034	2034	2034	2034	2034	2054	2001	1988	2070	2000	1625	1709	1339	1339	1929	2001	1887	1539	1552	..	..	1136	..
Muzzle Energy: Total, in ft.-tons	..	1550	1448	..	29850	24030	12580	7271	5374	3806	2386	1511	2882	1087	258	233	3105	2239	2018	2357	1076	..	..	..	..	..	..
Muzzle Energy: Per inch circumference, ft.-tons	..	87·4	73·2	..	754·3	694·0	423·9	294·1	241·4	191·1	137·8	101·9	153·3	73·33	..	..	110·0	89·1	1071	127·8	72·6	..	..	..	..	..	..
Perforation at Muzzle, in inches	..	†9·3	8·8	..	†32·9	†28·7	†24·6	†20·5	†18·6	†16·6	†13·9	†11·6	†14·4	†9·3	..	..	10·6	9·6	†11·0	†12·7	†9·7	..	..	..	..	..	..
Metal and Construction	St. & Cast Iron.				St. Jacket and Hoops.								St.				St. and Wt. I.		St.	St.							

18 and 16-cm. Palliser guns and 16 and 13-cm. Parrot guns also exist, and some bronze muzzle loaders. St. stands for Steel; I. for Iron.

There is also a 20-cm. (7·87-in.) B.L. Hontoria, Pattern 79, weighing 10·8 tons, firing an armour-piercing projectile weighing 180·8 lbs. with a charge of 61·73 lbs.

* Total length, the length of bore not being supplied. † By Krupp's formula. ‡ These weights include the charge and case.

NAVAL ORDNANCE OF SWEDEN AND NORWAY.

	Sweden.													Norway.										
	Breech Loaders.			Model 76.		Model 81.		Model 83.		M. 85.	M. 86.	M. 89.	M.L.	Krupp, B.L.					Armstrong, M.L.				Palliser, M.L.	
Designation by Calibre, in cms.	27	24	17	27	24	27	12	15	8	25	6·5	15	12	26 No. 2.	26 No. 1.	15	12 No. 2.	12 No. 1.	26·7 No. 3.	26·7 No. 2.	26·7 No. 1.	20·2	16·7	15·5
Calibre, inches	10·80	9·45	6·58	10·80	9·45	10·80	4·72	6·00	3·31	10·00	2·60	6·0	4·80	10·24	10·24	5·91	4·72	4·72	10·51	10·51	10·51	7·94	6·58	6·11
Total Length, feet	17·46	14·96	11·27	17·65	16·24	23·10	10·29	13·87	7·37	28·33	3·79	16·98	8·87	25·59	18·77	12·63	13·78	9·60	16·87	14·65	13·45	10·82	11·58	10·30
Length: Rifled Portion of Bore, ins.	160·8	137·0	107·8	159·2	150·5	191·6	94·5	124·1	71·3	2609	35·0	155·2	83·3	218·9	160·4	112·4	128·6	85·9	138·7	121·0	110·6	85·7	92·4	91·7
Length: Chamber, "	29·9	25·9	16·5	32·3	28·1	66·2	20·6	31·1	9·7	58·1	4·2	35·2	13·6	55·4	34·1	22·6	36·8	16·5	36·8	24·0	20·6	18·5	19·3	10·8
Length: Bore in calibres, "	17·2	17·1	18·7	17·8	18·9	23·9	24·0	25·7	24·3	32·9	15·4	32	20·2	30	19·0	22·8	35	25	16·7	13·8	12·5	13·2	17·0	16·8
Number of Grooves	5	5	5	42	36	45	30	28	24	42	26	28	8	60	60	36	32	32	8	8	8	6	3	3
Twist of Rifling	30*	30*	30*	45*	..	40*	30*	30	33*	40*	22*	30	40	825	45	45	∝25	40	55	55	55	50	34	34
Total Weight, tons	23·6	14·4	5·2	23·6	16·4	27·1	1·9	4·2	4·2	29·8	9·4	5·2	1·9	24·8	21·7	3·9	2·81	1·38	21·7	19·7	18·2	7·4	4·9	3·4
Weight of: Armour-piercing Shell in lbs.	476·2†	317·5†	107·1†	476·2†	317·5†	476·2†	..	100·0	..	449·7	..	100	..	606·3	463·0	86·0	57·3	44·1	448·6	393·5	384·9	157·4	109·8	..
Weight of: Common Shell, in lbs.	396·8	224·9	97·7	396·8	273·4	396·8	48·5	100·0	14·8	401·2	6·2	100	34·6	606·3	381·4	69·4	57·3	36·1	316·4	316·4	316·4	153·9	82·7	59·1
Weight of Firing Charge: Armour-piercing Shell, in lbs.	83·8	59·5	22·0	90·4	56·2	206·4	..	35·3	..	242·5	..	54·0	..	191·8	99·2	22·0	19·8	9·9	110·2	82·7	66·1	29·8	22·0	..
Weight of Firing Charge: Common Shell, lbs.	83·8	59·5	22·0	90·4	56·2	145·5	16·0	35·3	3·3	242·5	0·9	..	6·6	191·8	81·6	20·9	19·8	9·9	77·2	77·2	48·5	29·8	16·5	7·72
Muzzle Velocity, feet.	1322	1312	1365	1378	1365	1788	1640	1663	1542	2100	1148	2067	..	1722	1575	1624	1804	1493	1549	1444	1296	1247	1329	1116
Muzzle Energy: Total foot-tons	5771	3789	1384	6272	4102	10550	..	1918	..	13750	..	2964	..	12460	7966	1573	1290	680	7463	5692	4484	1696	1345	..
Muzzle Energy: Per inch Circumference.	170·1	127·6	66·9	184·9	138·2	311·3	..	101·7	..	437·7	..	157·2	..	387·4	247·7	84·7	87·1	45·9	226·0	172·4	135·8	68·0	65·1	..
Muzzle Energy: Perforation through Iron**	13·19	11·4	8·3	13·8	11·9	18·4	..	10·4	..	21·9	..	13·1	..	20·4	16·2	9·5	9·7	7·0	15·5	13·4	11·8	8·3	8·2	..
Muzzle Energy: Ditto by Tresidder's formula	..	..	..	..	..	18·9	..	10·5	..	24·5	..	13·9	..	20·9	15·9	9·4	10·5	..	15·1	..	..	..	..	..

Sweden.—The breech-loaders have breech screw-stoppers. The whole of the guns which do not fire shrapnel discharge case-shot.

Norway.—Besides the chilled shell, there are chilled solid shot for the 26·7-cm. and the 20·2-cm. guns, and for all muzzle-loaders case-shot also, besides steel shrapnel for some Krupp guns. * Maximum rate of increasing twist. ** By Fairbairn's formula. † The 16·7 muzzle-loading gun fires steel solid shot.

Note.—There are a few later pattern B.L. and Q.-F. guns, including 8·2 Elswick guns, 5·9-in. Krupp Q.-Fs., and 4·7-in. Elswick Q.-Fs.

UNITED STATES NAVAL ORDNANCE.

NATURE OF GUN.	Calibre.	Weight.	Total Length.	Total Length of Bore.	Length of Rifling.	Twist of Rifling.	Length of Chamber.	Weight of Service-charge (not Smokeless Powder.)	Weight of Projectile.	Muzzle Velocity (Service). Brown Powder.	Muzzle Energy. Brown Powder.	Perforation of Wrought Iron at Muzzle.‡
	inch.	tons.	feet.	inch.	inch.		inch.	lbs.	lbs.	ft.-seconds.	ft.-tons.	inch.
3-in. (14 pr.)	3	0·87	12·5	149·7	125·5	..	21·3	..	14	3000	874	13·5
4-in. Q.-F., Mark I.	4	1·5	13·7	157·3	130·3	zero to 1 in 25	24·7	12 to 14	33	2000	915	9·8
4-in. Q.-F. Gun	4	1·5	13·7	157·5	128·1	..	25·4	..	33	2000*	..	9·8
4-in. Q.-F., Mark VII., of 50 Cals.	4	2·56	17·0	200·0	168·4	..	31.6	..	32	3000†	1,909	17·6
5-in. Q.-F., Mark I.	5	2·8	13·5	150·3	120·8	1 in 180 to 1 in 30	27·1	26 to 29	60	2000	1,660	11·8
5-in. Q.-F. Gun	5	3·1	17·4	191·5	164·4	zero to 1 in 25	32·0	28 to 30	50	2300	1,834	13·2
5-in. Q.-F., Mark V.	5	4·46	21·3	250	212·9	..	37·2	..	60	2900†	3,503	20·5
6-in. B.L.R., Mark I.	6	4·8	15·8	176·0	136·7	1 in 180 to 1 in 30	36·9	50	100	2000	2,773	..
6-in. B.L.R., Mark II.	6	4·9	16·1	180·1	144·9	..	32·7	45 to 48	100	2000	..	13·8
6-in. B.L.R., Mark III., of 30 Cals.	6	4·8	16·3	183·8	147·3	zero to 1 in 25	34·0	44 to 47	100	2000	..	..
6-in. B.L.R., Mark III., of 35 Cals.	6	5·2	18·8	213·8	177·3	..	34·0	..	100	2080	2,990	14·7
6-in. B.L.R., Mark III., of 40 Cals.	6	6·0	21·3	243·8	207·3	..	34·0	..	100	2150	3,204	15·4
6-in. Q.-F. Gun	6	6·0	21·3	243·8	204·3	..	37·0	44 to 47	100	2150	3,200	15·4
6-in. Q.-F., Mark VI.	6	8·17	25·0	293·7	245·3	..	48·4	..	100	2900†	5,838	24·2
8-in. B.L.R., Mark I.	8	12·3 / 12·9	21·5	239·9	195·2	1 in 180 to 1 in 30	42·1	105 to 115	250 / 250	2000 / 2000	6,932	19·0
8-in. B.L.R., Mark II.	8	13·0	21·5	239·9	195·2	..	42·1	..	..	..	..	19·0
8-in. B.L.R., Mark III., of 35 Cals.	8	13·1	25·4	290·5	242·8	zero to 1 in 25	45·1	..	250	2080	7,498	20·1
8-in. B.L.R., Mark III., of 40 Cals.	8	15·2	28·7	330·5	282·8	..	45·1	..	250	2150	8,011	21·1
8-in. B.L.R., Mark V., of 45 Cals.	8	18·0	28·6	335·0	271·0	..	64·0	..	250	2800†	13,602	31·4
10-in. B.L.R., Mark I., of 30 Cals.	10	25·7	27·4	306·3	247·3	1 in 180 to 1 in 35	57·2	225 to 240	500	2000	13,864	24·0
10-in. B.L.R., Mark I., of 35 Cals.	10	27·1 / 28·2	30·5	343·8	283·7	zero to 1 in 25	57·2	..	500	2060	14,709	25·0
10-in. B.L.R., Mark II., of 30 Cals.	10	25·1	27·4	307·3	247·3	zero to 1 in 26·8	57·2	..	500	2000	13,864	24·0
10-in. B.L.R., Mark II., of 35 Cals.	10	27·6	31·2	354·9	294·9	zero to 1 in 25	57·2	..	500	2100	15,285	25·8
10-in. B.L.R., Mark III., of 40 Cals.	10	33·4	33·3	389·0	313·4	..	75·6	..	500	2800†	27,204	42·0
12-in. B.L.R., Mark I.	12	45·2	36·8	419·2	343·1	..	74·1	425	850	2100	25,985	30·8
12-in. B.L.R., Mark III., of 40 Cals.	12	52	41·8	480·1	388·1	..	91·9	..	850	2800†	46,246	47·2
13-in. B.L.R., Mark I.	13	60·5	40·0	454·5	370·5	..	80·9	550	1100	2100	33,627	33·5

NOTE.—The weight of fixed ammunition for Q.-F. 4-in. and 5-in. guns is 58 and 95 lbs. respectively. * With smokeless powder 4″ = 2200, 5″ = 2650, 6″ = 2550, 8″ = 2300, 10″ = 2200, 12″ = 2300, 13″ = 2300. The charges are kept down to suit the sight bars. † It should be pointed out that these high velocities cannot be fairly compared with the velocities on the British table, because the former are obtained with new guns, while the latter are purposely taken as what might be expected on service after the gun has fired a considerable number of rounds. ‡ By Tresidder's formula.

ELSWICK GUNS.

This Table is supplied by the Manufacturers.

	*	*	*	*		*		*	* Field and Naval	* Field and Naval	*	*	*	*					*	*			*				*			*	*		*	
Diameter of Bore, ins. ...	1·46	1·46	1·46	1·85		2·244		2·244	3·0	3·0	3·0	3·0	3·5	4	4		4·7	4·7	5·87	6	6	7·5	8		8		8·24	9·2	9·45	10	10		12	12
do. do. m.m. ...	37	37	37	47		57		57	76·2	76·2	76·2	76·2	89	102	102		120	120	149	152	152	190	203		20		210	234	240	254	254		305	305
Length of Bore, cals. ...	20	25	45	40		40		50	23	28	40	50	40	45	50		45	50	46	40	50	45	45		48·3		44	45	40	40	45		40	45
do. Gun, cals. ...	22·7	27·8	46·7	43·6		43·6		53·6	24	29·2	41·2	51·2	41·3	46·3	51·3		46·1	51·1	47·6	41·54	51·54	46·74	46·7		50		45·5	46·85	41·8	41·64	46·64		41·7	46·7
Weight of Gun	lbs. 73	lbs. 79	lbs. 268	lbs. 506		lbs. 800		cwt. 10	cwt. 5	cwt. 7·5	cwt. 12	cwt. 18	cwt. 24	cwt. 38	cwt. 40		cwt. 55	cwt. 57	tons. 7	tons. 6·6	tons. 9	tons. 13	tons. 18·5		tons. 19·7		tons. 18·1	tons. 28	tons. 26·3	tons. 30	tons. 38		tons. 49	tons. 58
do. Projectile, lbs. ...	1·1	1.1	1·5	3·3		6		6	12·5	12·5	12·5	12·5	20	25	25	31	45	45	99·25	100	100	200	210	250	210	250	308·6	380	410	450	450	500	850	850
do. Battering Charge	ozs. 1·125	ozs. 1·125	ozs. 4·5	ozs. 6·375	ozs. 7·94	ozs. 7·75	ozs. 9·2	ozs. ...	ozs. 13·62	ozs. 13·5	lbs. 1·94	lbs. 3	lbs. 4	lbs. 7·75	lbs. 7·75	lbs. 7·75	lbs. 10	lbs. 10	lbs. 21.5	lbs. 18·5	lbs. 36	lbs. 65	lbs. 47	lbs. 47	lbs. 67	lbs. 67	lbs. 47	lbs. 105	lbs. 72	lbs. 81·5	lbs. 125	lbs. 125	lbs. 141	lbs. 260
Muzzle Velocity, f.-s. ...	1319	1540	2300	1873	2132	1820	1968	2593	1550	1585	2335	2800	2430	2935	3000	2800	2670	2750	2625	2500	3000	2900	2650	2480	3000	2810	2300	2800	2500	2400	2910	2784	2400	2725
Velocity at 2,500 yards, f.-s.	529	564	819	867	923	932	971	1168	945	955	1102	1308	1274	1466	1480	1642	1608	1657	1824	1712	1986	2130	1935	1902	2085	2141	1848	2220	1993	1892	2261	2255	2022	2305
Muzzle Energy, f.-t. ...	13·3	18·1	55·0	80·3	104	137·8	161	279·5	208·2	217·8	473	680	819	1493	1560	1685	2224	2360	4742	4331	6240	11663	10226	10662	13105	13688	11320	20668	17769	17973	26423	26949	33949	43767
Energy at 2,500 Yards, f.-t.	...	...	...	17·2	19·5	36·1	39·2	56·8	77·4	79·1	105	148	225	373	380	580	807	857	2290	2032	2735	6292	5452	6271	6330	7969	7308	12986	11292	11170	15952	17630	24098	31315
Perforation at Muzzle, ins.	1·5	1·9	4·3	4·3	5·2	5·6	5·6	8·6	4·8	4·9	8·8	11·6	11·0	14·5	13·0	16·0	16·2	17·0	21·5	19·5	25·7	31·0	26·0	26·8	31·1	32·3	27·0	36·9	31·9	29·9	41·0	41·0	38·4	46·5
Rounds per Minute ...	...	...	25	30	30	25	25	25	20	20	20	20	17	15	15	15	10	10	8	8	8	5	4	3	4	3	3	2	2	2	2	2	...	...

Guns from 3 to 6 inches can be fitted with either a metallic cartridge case or modified De Bange pad.
*** Existing or service guns.**
These high velocities, however, are not desirable, except on very rare occasions, on account of the excessive wear of the guns. They are, however, obtained with pressures under 17 tons.

RAPIDITY—SOME RESULTS ACTUALLY OBTAINED.

4·7-in. 42 cwt. gun, with single motion breech mechanism, 5 rounds in 22 seconds, at Silloth, at a target, 2 hits, range 1,000 yards; 7 rounds in 25 seconds at drill.

6-in. Admiralty gun, with three-motion breech mechanism and E.X.E. powder, 10 rounds in 85 seconds, at sea, on board gunboat Kite; 18 rounds in 3 minutes, H.M.S. Royal Arthur, 14 hits on target, ship steaming 8 knots, range from 1,600 to 2,200 yards; 18 rounds in 3 minutes, H.M.S. Blake, 15 hits on target, ship steaming 8 knots, range from 1,600 to 2,200 yards. Total number of rounds fired from 10 guns in same time 148, of which 110 hit the target.

6-in. 6·6-ton gun, with single motion breech mechanism, 7 rounds in 61 seconds, at Silloth, cordite charge; 4 rounds in 20 seconds, at drill.

8-in. 15·5-ton gun, with single motion breech mechanism, 3 rounds in 28 seconds at drill; 4 rounds in 62 seconds, on board cruiser Blanco Encalada, ammunition supplied from magazine.

13·5-in. 68-ton B.L. gun, with hydraulic breech mechanism, 7 rounds in 12 minutes, H.M.S. Royal Sovereign, 6 hits on target, ship steaming 8 knots, range from 1,600 to 2,200 yards; 4 rounds in 6 minutes, H.M.S. Empress of India, with an interval between rounds of only 1 minute 27 seconds.

12-in. 46-ton B.L. gun, interval between 2 rounds, 1 minute 19 seconds, H.M.S. Majestic; 1 minute 4 seconds, H.M.S. Cæsar.

12-in. gun, interval between 2 rounds, 49 seconds, H.M.S. Illustrious; 6 rounds were fired from one turret in 1 minute 47 seconds.

A pair of 12-inch guns, 8 rounds in 2 minutes 10 seconds.

VICKERS, SONS AND MAXIM'S Q.F. GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

	—	* 37 m.m. 30 cal.	* 37 m.m. 42·5 cal.	* 47 m.m. 40 cal.	* 47 m.m. 47·2 cal.	* 57 m.m. 42·3 cal.	* 57 m.m. 50 cal.	* Naval. 76·2 m.m. 45 cal.	* Naval. 76·2 m.m. 50 cal.	* Field. 76·2 m.m. 23·5 cal.	* Mountain. 75 m.m. 10·7 cal.
Gun.	Diameter of Bore (in ins.)	1·457	1·457	1·85	1·85	2·244	2·244	3	3	3	2·953
	Length of Bore (in ins.)	43·5	62·0	73·72	87·34	95	112·2	135	150	70·5	31·6
	Total length of Gun (in ins.)	73·75	94·0	77·95	91·5	104·4	116·4	140	155	75·55	35·85
	Diameter of Chamber	1·44	1·6	2·04	2·04	2·45	2·8	3·6	3·6	3·4	3·0
	Length of Chamber	2·64	3·78	12·93	12·93	10·2	14·2	15·4	15·4	9·6	4·575
	Maximum pressure in Chamber	13 tons	14 tons	13 tons	13 tons	15 tons	15 tons	16 tons	16 tons	14 tons	8 tons
	Nature of Charge	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite
	Weight of Charge	oz. grs. 1 110	oz. grs. 3 0	oz. 9	oz. 11	oz. 15	lb. oz. 1 4	lb. oz. 2 9	lb. oz. 2 9	lb. 1	ozs. 6·25
	Weight of Projectile	1 lb.	1·25 lbs.	3·3 lbs.	3·3 lbs.	6 lbs.	6 lbs.	12·5 lbs.	12·5 lbs.	12·5 lbs.	12·5 lbs.
	Total weight of Gun, including Breech Mechanism	c. q. l. 4 0 22	c. q. l. 5 1 26	c. q. l. 4 0 0	c. q. l. 4 2 6	c. q. l. 6 2 0	c. q. l. 8 0 0	c. q. l. 14 2 14	c. q. l. 15 3 0	c. q. l. 5 2 23	c. q. l. 2 0 13
	Muzzle Velocity in feet per second	1800	2350	2125	2400	2300	2500	2600	2700	1700	918
	Muzzle Energy in foot tons	22·5	48	103	132	220	260	586	632	250·4	73
	Penetration of Wrought Iron Plate at Muzzle by Gavre's formula	1·9	3·3	4·5	5·3	6·2	7	9·2	9·7	..	..
	Penetration of Steel Plate at Muzzle by Gavre's formula	1·5	2·6	3·5	4·1	4·8	5·4	7·1	7·5	..	..
	†Perforation of Wrought Iron at Muzzle (Tresidder's formula)	..	..	..	..	7·1	7·9	10·25	10·8	5·4	..
	Rounds per minute	300	300	30	30	28	28	20	20	20	14
Mounting.	Weight of Mounting complete with Shield	c. q. l. 3 0 22	c. q. l. 3 2 5	c. q. l. 9 3 0	c. q. l. 10 0 18	c. q. l. 12 2 0	c. q. l. 12 0 0	t. c. q. l. 1 6 0 0	t. c. q. l. 1 7 0 0	Carriage and limber with accessories and 40 rounds of ammunition.	c. q. l. 5 3 5
	Thickness of Shield (in ins.)	¼	no shield	¼	¼	3/16	¼	2	2		no shield
	Weight of Shield	c. q. l. 0 3 11	..	c. q. l. 1 3 0	c. q. l. 1 3 0	c. q. l. 1 0 0	c. q. l. 1 3 9	c. q. l. 9 2 0	c. q. l. 10 0 0	t. c. q. l. 1 4 0 0	..
	Angle of Elevation	16°	13°	18°	18°	20°	20°	20°	20°	17°	26°
	Angle of Depression	25°	25°	15°	12°	20°	15°	10°	10°	5°	10°

	—	* 101·6 m.m. 45 cal.	* 101·6 m.m. 50 cal.	* 12 c.m. 40 cal.	* 12 c.m. 45 cal.	* 15·24 c.m. 40 cal.	* 15·24 c.m. 45 cal.	‡ 20·3 c.m. 45 cal.	‡ 23·36 c.m. 45 cal.	‡ 25·4 c.m. 42 cal.	* 30·48 c.m. 40 cal.
Gun.	Diameter of Bore (in ins.)	4	4	4·724	4·724	6	6	8	9·2	10	12
	Length of Bore (in ins.)	180	200	188·98	212·58	240	270	360	414	405·15	480
	Total length of Gun (in ins.)	186·1	206	193·28	217	249·2	279·2	372·1	426·8	120	496·5
	Diameter of Chamber	5	5	5·1	5·5	6·8	8·5	11	13·5	11·5	17·5
	Length of Chamber	21·2	21·2	25·5	25·75	32·5	33	43	67	63·35	872
	Maximum pressure in Chamber	17 tons	17 tons	16 tons	17 tons	16 tons	17 tons	17 tons	17 tons	17 tons	17 tons
	Nature of Charge	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite	Cordite
	Weight of Charge	lbs. 6	lbs. 6	lbs. 8·5	lbs. 9	lbs. 19	lbs. 25	lbs. 50	lbs. 94·5	lbs. 100	lbs. 207
	Weight of Projectile	25 lbs.	25 lbs.	45 lbs.	45 lbs.	100 lbs.	100 lbs.	250 lbs.	380 lbs.	450 lbs.	850 lbs.
	Total weight of Gun, including Breech Mechanism	t. c. q. l. 1 13 0 0	t. c. q. l. 1 16 0 0	t. c. q. l. 2 10 0 0	t. c. q. l. 2 14 0 0	t. c. q. l. 6 15 0 0	t. c. q. l. 7 8 0 0	t. c. q. l. 18 16 2 0	t. c. q. l. 26 16 0 0	t. c. q. l. 28 4 0 0	t. c. q. l. 50 7 0 0
	Muzzle Velocity in feet per second	2700	2800	2494	2600	2530	2775	2625	2750	2580	2600
	Muzzle Energy in foot tons	1263	1359	1940	2109	4437	5340	11945	19927	20811	59843
	Penetration of Wrought Iron Plate at Muzzle by Gavre's formula	11·6	12·3	13·3	14·1	18·5	21·1	27·6	34·3	32·3	42·3
	Penetration of Steel Plate at Muzzle by Gavre's formula	9	9·5	10·3	10·9	14·4	16·4	21·4	26·6	25·0	32·8
	†Perforation of Wrought Iron at Muzzle (Tresidder's formula)	13·3	14·0	14·6	15·5	19·8	22·6	28·5	32·7	33·4	42·4
	Rounds per minute	15	15	12	12	8	8	5	..	..	..
Mounting.	Weight of Mounting complete with Shield	t. c. q. l. 4 4 3 0	t. c. q. l. 4 10 0 0	t. c. q. l. 5 17 0 0	t. c. q. l. 6 5 0 0	t. c. q. l. 8 15 0 0	t. c. q. l. 9 5 0 0	t. c. q. l. 16 8 0 0		Depending on type of mounting used.	
	Thickness of Shield (in ins.)	4	4	4	4	4	4	4			
	Weight of Shield	t. c. q. l. 2 6 0 0	t. c. q. l. 2 6 0 0	t. c. q. l. 3 18 0 0	t. c. q. l. 3 18 0 0	t. c. q. l. 4 0 0 0	t. c. q. l. 4 0 0 0	t. c. q. l. 7 0 0 0			
	Angle of Elevation	20°	20°	20°	20°	16°	16°	15°			
	Angle of Depression	7°	7°	7°	7°	7°	7°	5°			

Older types of 9·2-in., 10-in., 12-in. and 13·5-in. guns, as manufactured by Vickers, Sons & Maxim, Limited, are not enumerated in the table, but only modern guns making use of smokeless powders.

* Existing guns. † The perforations through wrought iron (Tresidder's) are added by the compiler for purposes of comparison. ‡ Under manufacture.

SCHNEIDER - CANET QUICK - FIRE GUNS.

This Table is supplied by the Manufacturers.

* Guns in actual use.

Calibre, in centimètres	24		20			152·4		15			14	12			
Calibre, in inches	9·45		7·87			6		5·91			5·5	4·72			
Length, in calibres	40	*45	40	*45	50	*45	*50	*40	*45	*50	*45	*30	*40	*45	*50
Length, in feet	31·5	35·4	26·2	29·5	32·7	25	27	19·6	22·2	24·6	20·8	11·8	15·7	17·7	19·7
Weight of Gun, in tons	21·45	22·73	11·61	13·18	14·96	5·65	5·08	4·72	5·61	6·20	4·72	1·61	2·36	2·75	3
Weight of Projectile, in lbs.	331	331	198	198	198	94·9	94·9	88·2	88·2	88·2	88·2	39·7	46·3	46·3	46·3
Muzzle Velocity, in ft.-secs.	2690	2790	2630	2760	2860	2670	2750	2560	2660	2740	2370	1970	2530	2630	2710
Muzzle Energy, in ft.-tons	16612	17838	9484	10450	11258	4559	4959	4000	4330	4590	31432	1114	2048	2216	2348
Velocity at 2000 mètres, in ft.-secs.	2075	2147	1944	2039	2111	1860	1900	1744	1813	1858	1690	1170	1581	1645	1691
Energy at 2000 mètres, in ft.-tons	9900	10600	5250	5750	6120	2254	2399	1860	2000	2150	1739	387	800	870	955
Perforation at muzzle, Gavre formula, in ins.	34·1	36·04	27·3	29·5	31·1	22·2	23·3	19·6	20·8	21·8	19·3	9·7	15·1	16·2	16·8
" " Tresidder formula, through wrought-iron, in ins.	31·3	33·1	25·6	27·5	29·0	21·0	22·0	19·1	20·2	21·0	17·6	10·4	15·2	16·1	16·8
Perforation at 2000 mètres, in ins.	22·9	24	17·2	18·5	19·5	12·7	13·3	10·9	11·5	12·1	12·4	4·3	6·3	6·7	6·9

Calibre, in centimètres	10			9	7·5			6·5			5·7		47	37
Calibre, in inches	3·94			3·5	2·95			2·57			2·24		1·85	1·46
Length, in calibres	*45	*50	*60	*30	*45	*50	*60	*45	*50	*60	*50	*60	*60	*60
Length, in feet	14·8	16·4	19·7	8·8	11·04	12·3	14·8	9·59	10·65	12·8	9·34	11·2	9·24	7·27
Weight of Gun, in tons	1·69	1·83	2·18	0·71	0·8	0·88	1·08	0·49	0·54	0·68	0·45	0·59	0·26	0·14
Weight of Projectile, in lbs.	28·6	28·6	28·6	16·7	13·2	13·2	13·2	9·8	9·8	9·8	5·9	5·9	3·3	1·7
Muzzle Velocity, in ft.-secs.	2490	2630	2820	1970	2430	2530	2760	2360	2459	2721	2426	2721	2688	2622
Muzzle Energy, in ft.-tons	1235	1367	1587	451	540	587	696	342	372	455	243	307	167	34·5
Velocity at 2000 mètres, in ft.-secs.	1475	1557	1672	1020	1291	1337	1462	1167	1203	1327	1101	1209	1045	826
Energy at 2000 mètres, in ft.-tons	439	485	560	121	155	165	197	83·5	90	108	51	50	25	8·3
Perforation at muzzle, Gavre formula, in ins.	12·6	13·7	15·3	7·4	9·3	9·99	11·3	7·75	8·3	9·4	6·95	8·30	6·4	5·08
" " Tresidder formula, through wrought-iron, in ins.	12·7	13·8	15·3	7·2	9·4	10·1	11·5	8·5	9·0	10·5	7·3	8·7		
Perforation at 2000 mètres, in ins.	5·06	6·16	6·8	3·10	3·55	3·75	4·3	2·62	2·78	3·9	2·06	2·3	1·5	0·85

KRUPP QUICK-FIRE GUNS, Model 1897.

Table supplied by Manufacturers.

LIGHT GUNS.

Calibre, in centimètres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·00	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Piece, in lbs.	1488·2	1710·8	1935·7	4078	4740	5401	6107	7055	7937	11707	13448	15212	32294	37254	41890	48722	56222	63273	77603	89062	100753	100312	115081	130070
Weight of Piece, in tons	0·66	0·76	0·86	1·82	2·12	2·41	2·73	3·15	3·54	5·23	6·00	6·79	14·42	16·63	18·70	21·75	25·10	28·25	34·65	39·76	44·98	44·78	51·14	58·07
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·23	2·58	3·04	5·95	7·10	8·38	11·22	12·74	14·88	21·61	24·27	28·66	59·30	66·27	78·70	85·98	101·45	114·42	142·64	161·05	189·6	184·1	209·44	244·7
Muzzle Velocity, in ft.-secs.	2349	2539	2703	2362	2556	2723	2569	2772	2956	2526	2726	2907	2566	2766	2969	2592	2795	2995	2602	2808	3012	2598	2802	3005
	2083	2254	2402	2087	2254	2402	2267	2444	2608	2267	2444	2608	2303	2487	2664	2303	2487	2664	2303	2487	2664	2303	2487	2664
Muzzle Energy, in ft.-tons	438·6	512·1	581·5	1197	1430	1588	2121	2465	2807	4007	4663	5303	11353	12779	15192	17439	20298	23334	27985	31528	37443	36090	40660	48290
Perforation through Steel, in ins.	5·87	6·58	7·20	8·4	9·37	10·28	10·95	12·21	13·4	13·7	15·24	16·7	20·0	22·32	24·6	23·5	26·18	28·9	27·9	31·14	34·3	30·5	34·06	37·6
Perforation through Iron, Tresidder's formula	8·1	9·1	10·0	11·4	12·5	13·8	14·6	16·3	18·0	17·9	20·0	22·1	25·6	28·8	31·8	30·0	33·3	36·9	35·1	39·1	43·2	38·1	42·6	47·1

HEAVY GUNS.

Calibre, in centimetres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·0	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Piece, in lbs.	1860·7	2094·4	2325·9	5115	5732	6393	7628	8598	9524	14639	16535	18298	40345	45633	50486	58642	68560	73193	97000	109132	121250	125224	140874	156530
Weight of Piece, in tons	0·83	0·94	1·04	2·28	2·56	2·85	3·41	3·84	4·25	6·54	7·38	8·17	18·01	20·37	22·54	26·18	30·61	32·68	43·31	48·72	54·13	55·9	62·44	69·9
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·40	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·40	2·73	3·10	7·94	9·00	10·41	11·86	13·27	15·54	22·71	24·45	29·76	62·83	70·73	82·23	94·36	108·14	119·27	151·02	174·16	197·3	194·7	224·9	255·7
Muzzle Velocity, in ft.-secs.	2448	2635	2805	2658	2845	3035	2710	2904	3104	2667	2864	3051	2664	2854	3051	2687	2887	3084	2707	2904	3100	2697	2894	3087
	2172	2336	2490	2349	2510	2684	2392	2566	2740	2392	2566	2740	2392	2566	2740	2392	2566	2740	2392	2566	2740	2392	2566	2740
Muzzle Energy, in foot-tons	476·6	551·5	626	1519	1736	1984	2361	2720	3099	4461	5131	5853	12246	14102	16070	18812	21653	24685	30191	34690	39611	38935	44758	51090
Perforation through Steel, in ins.	6·22	6·93	7·56	9·96	10·94	12·0	11·8	13·07	14·3	14·8	16·30	17·9	21·1	23·35	25·6	24·8	27·40	30·1	29·4	32·56	35·7	32·2	35·59	39·1
Perforation through Iron, Tresidder's formula	8·5	9·5	10·5	13·3	14·7	16·4	15·7	17·6	19·3	19·5	21·6	23·8	27·0	30·1	33·0	31·4	35·0	38·4	36·9	41·0	45·1	40·1	44·6	49·1

NOTE.—Every one of the Guns included in the Tables has been actually constructed and can be supplied on order. Fresh orders are all executed according to model 1899.

KRUPP QUICK-FIRE GUNS, Model 1899.

Table supplied by Manufacturers.

LIGHT GUNS.

Calibre, in centimètres		7·5			10·5			12			15			21			24			28			30·5	
Calibre, in inches		2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01	
Total Length of Gun, in cal.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·0	24·46	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Piece, in lbs.	1488·2	1710·8	1935·7	4078	4740	5313	6107	7055	7937	11707	13448	15212	32294	37254	41890	48722	56222	63273	77603	89062	100974	100312	115081	130290
Weight of Piece, in tons	0·66	0·76	0·86	1·82	2·12	2·37	2·73	3·15	3·54	5·23	6·00	6·79	14·42	16·63	18·70	21·75	25·10	28·25	34·65	39·76	45·08	44·78	51·14	58·17
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·78	3·13	3·55	8·37	9·49	10·75	12·21	14·31	16·56	23·42	27·44	31·76	64·55	75·64	87·55	97·35	114·09	132·0	152·2	181·88	210·5	200·4	234·79	271·7
Muzzle Velocity, in ft.-secs.	2690	2890	3067	2720	2920	3097	2766	2982	3199	2720	2936	3143	2776	2995	3215	2805	3025	3248	2818	3038	3264	2812	3035	3255
	2388	2565	2723	2395	2577	2733	2438	2631	2822	2438	2631	2822	2494	2690	2887	2494	2690	2887	2494	2690	2887	2494	2690	2887
Muzzle Energy, in foot-tons	575·7	664·8	748·6	1581	1826	2056	2453	2856	3285	4631	5389	6196	13296	15490	17845	20427	23783	27397	32786	38143	43952	42274	49312	56666
Perforation through Steel, in ins.	7·12	7·91	8·62	10·2	11·3	12·3	12·1	13·4	15·0	15·2	16·9	18·7	22·8	24·9	27·6	26·5	29·2	32·4	31·5	34·7	38·5	34·5	38·0	42·0
Perforation through Iron, Tresidder's formula	9·8	11·0	11·8	13·5	15·2	16·5	16·2	18·2	20·1	20·1	22·5	25·0	28·9	32·1	36·0	33·4	37·4	41·9	39·1	44·0	49·0	42·8	47·8	53·5

HEAVY GUNS.

Calibre, in centimètres		7·5			10·5			12			15			21			24			28			30·5	
Calibre, in inches		2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01	
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·0	24·46	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Piece, in lbs.	1860·7	2094·3	2325·9	5115	5732	6393	6680	7628	8598	12787	14661	16535	35270	40341	45413	53241	60843	68340	84882	97000	109132	109573	125224	140874
Weight of Piece, in tons.	0·83	0·93	1·04	2·28	2·56	2·85	2·98	3·41	3·84	5·74	6·55	7·38	15·75	18·01	20·27	23·32	27·16	30·51	37·89	43·30	48·72	48·92	55·90	62·44
Weight of Steel Projectile, in lbs.	11·5	11·5	11.5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59.52	59·52	59·52	112·4	112.4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	3·0	3·35	3·77	9·22	10·41	12·02	14·11	15·72	18·50	27·07	30·16	35·49	74·65	83·11	97·84	112·6	125·36	147·6	179·45	199·82	235·2	231·66	257·96	303·7
Muzzle Velocity, in ft.-secs.	2792	2975	3159	2917	3130	3330	2933	3143	3350	2891	3091	3294	2884	3087	3288	2913	3117	3320	2913	3123	3324	2910	3120	3320
	2476	2641	2805	2572	2760	2940	2585	2772	2953	2592	2772	2953	2592	2772	2953	2592	2772	2953	2576	2766	2940	2582	2766	2940
Muzzle Energy, in foot-tons	619·6	703·5	794·8	1820	2094	2375	2759	3172	3598	5228	6002	6809	14360	16458	18652	22073	25171	28656	35078	40305	45630	45340	52084	58957
Perforation through Steel, in ins.	7·52	8·22	8·97	11·3	12·5	13·7	13·2	14·6	16·0	16·5	18·2	19·6	23·6	26·3	28·4	27·7	30·6	33·7	32·7	36·2	39·5	35·9	39·7	43·3
Perforation through Iron, Tresidder's formula	10·5	11·4	12·3	15·3	17·0	19·0	17.8	19·7	21·7	22·0	24·3	26·9	30·5	33·5	37·0	35·5	39·1	43·2	40·8	45·4	49·8	45·4	50·0	54·5

NOTE.—Every one of the guns included in the Tables has been actually constructed and can be supplied on order.

Table Relating to Conversion of Measures.

Length.

Metric to English. | English to Metric.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.).	of feet in 12·4 mètres (see cols. I. & III.).	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm.	of mètres in 1026 yards (see cols. V. & VI.).	of mètres in 1742 feet (see cols. VII. & VIII.).	of centimètres in 17·72 ins. (see cols. IX. & X.)
mètres. yards. 2000=2187·3 300= 328·09 50= 54·68 4= 4·37	mètres. feet. 10 =32·809 2 = 6·562 0·4= 1·312	cms. inches. 30·0=11·811 ·5= ·197	yards. mètres. 1000=914·38 20= 18·29 6= 5·49	feet. mètres. 1000=304·79 700=213·36 40= 12·19 2= 0·61	inches. cms. 10·0 =25·400 7·0 =17·780 0·7 = 1·778 ·02= ·051
∴ 2354=2574·44	∴ 12·4=40·683	∴ 30·5=12·008	∴ 1026=938·16	∴ 1742=530·95	∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English. | English to Metric.

I. Kilogrammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilogrammes.	IX. Grains. Troy.	X. Gramme.
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier).	of pounds in 56·3 kilogrammes. (see cols. I. & III.).	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.)	of milliers in 38 tons (see cols. V. & VI.).	of kilogrammes in 68 pounds (see cols. VII. & VIII).	of grammes in 85 grains (see cols. IX. & X.).
milliers. tons. 30 = 29·53 5 = 4·92	kgrms. lbs. 50 =110·231 6 = 13·228 0·3= ·661	grammes. grains. 100=1543·23 20= 308·65	tons. milliers. 30 = 30·48 8 = 8·13	lbs. kgs. 60 = 27·216 8 = 3·629	grains. grammes. 80 = 5·184 5 = 0·324
∴ 35 = 34·45	∴ 56·3=124·120	∴ 120=1851·88	∴ 38 = 38·61	∴ 68 = 30·845	∴ 85 = 5·508

Note.—7000 grains troy=1 pound avoirdupois.

PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.
Kilogrammes per square centimètre.	Pounds per square inch.	Tons per square inch.	Pounds per square inch.	Kilogrammes per square centimètre.	Tons per square inch.	Kilogrammes per square centimètre.	Atmospheres.	Tons per square inch.	Tons per square inch.	Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01270	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21093	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).

kgs. per sq. cm.	lbs. per sq. in.
30 =	426·68
2 =	28·45
0·1 =	1·42
32·1 =	456·55

of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).

kgs. per sq. cm.	tons per sq. in.
3000 =	19·05
200 =	1·27
10 =	·06
∴ 3210 =	20·38

of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).

lbs. per sq. in.	kgs. per sq. cm.
10 =	·7031
5 =	·3516
∴ 15 =	1·0547

of kilogrammes per square centimetre in 18·3 tons per square inch (see cols. VI. & VII.).

tons per sq. in.	kgs. per sq. cm.
10 =	1574·9
8 =	1259·95
0·3 =	47·25
∴ 18·3 =	2882·10

of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).

atmospheres.	tons per sq. inch.
3000 =	19·69
200 =	1·31
50 =	·33
4 =	·03
∴ 3254 =	21·36

of atmospheres in 14·6 tons per square inch (see cols. X. & XI.).

tons per sq. in.	atmospheres.
10 =	1523·8
4 =	609·5
0·6 =	91·4
∴ 14·6 =	222.7

ENERGY.

Metric to English.		English to Metric.	
I.	II.	III.	IV.
Mètre-tons.	Foot-tons.	Foot-tons.	Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).

mètre-tons.	foot-tons.
4000 =	12916·2
300 =	968·72
60 =	193·74
7 =	22·60
∴ 4367 =	14101·26

of mètre-tons in 3592 foot-tons (see cols. III. & IV.).

foot-tons.	mètre-tons.
3000 =	929·1
500 =	154·84
90 =	27·87
2 =	·62
∴ 3592 =	1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versâ.*

1 inch steel = $1\frac{1}{4}$ inches iron ;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9{\cdot}4 \times \frac{4}{5} = 7{\cdot}52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5{\cdot}2 \times \frac{5}{4} = 6{\cdot}5 \text{ inches iron.}$$

PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

Statement of the First Lord of the Admiralty explanatory of the Navy Estimates for 1901-1902.

The Navy Estimates for 1901–1902 amount to a net total of £30,875,500, being an increase of £2,083,600 beyond the amount of £28,791,900 voted for the year 1900–1901.

The Manning Vote (Vote 1) shows an increase of £233,000, due in the main to the increased number of men last year and this year.

Vote 8, Shipbuilding, &c., shows a net increase of £1,274,900.

Vote 9, Armaments, is increased by £161,800.

Vote 10, Works, is increased by £137,300.

The remaining Votes show a net increase of £276,600.

The comparison in every case is with the original estimates of 1900–1901 plus the additional estimates voted in July, 1900.

NUMBERS.

The total number of Officers, Seamen and Boys, Coastguard, and Royal Marines proposed for the year 1901-1902 is 118,635, being an increase of 3,745.

The additions proposed are to meet the needs of the Fleet, and are made up of

287 Officers.
1,150 Seamen.
500 Stokers.
398 Miscellaneous.
310 Artizans (including 100 Electricians.)
1,000 Marines.
100 Apprentices (Shipwrights and Coopers).

MOBILISATION.

The plans for strengthening and developing the system of Reserves, referred to in last year's statement as under consideration, have been given effect to by the passing of an Act of Parliament

to establish a new Reserve force, to be called the Royal Fleet Reserve. It will consist partly of men who have served in the Navy or Royal Marines and left without taking pension (Class B), and partly of men who have been pensioned (Class A). The Seaman Pensioner Reserve will be superseded eventually by the new Royal Fleet Reserve, but the present Royal Naval Reserve is not affected.

The first entries in the new force will be made from the first of March of this year, and it is hoped to eventually raise the numbers of Class B to 15,000. The men in the new Royal Fleet Reserve will undergo periodical drill.

In order further to facilitate mobilisation another Act of Parliament was also passed, enabling the Admiralty, when the Royal Naval Reserve is called by Royal Proclamation into actual service, to limit the numbers to be called out to such as may from time to time appear desirable.

The Coast Guard and Port Guard Ships, which heretofore have had only a portion of their crews on board, are now kept fully manned. An additional Coast Guard ship has been commissioned and established at Rathmullen, in Ireland.

The Royal Marines.

2,630 Recruits were raised for the Corps during the year 1900, the Artillery branch receiving 616 of this number, the remainder going to the Infantry Divisions.

For the Artillery branch the mean height was 5 feet 8 inches, for the Infantry 5 feet 6 inches.

The twelve months produced a wastage of 2,165, the largest for some years. More than half of this number were men time expired, pensioned, purchased, and invalided, most of whom will be eligible for entry in the new Reserve, and will probably join it.

During the past year directions have been given for the training in Gunnery of the young officers Royal Marine Light Infantry to take place in the Gunnery School at Whale Island instead of at their Divisional Headquarters in the same manner as the young officers Royal Marine Artillery, whereby uniformity of instruction is ensured.

A fuller recognition has been made of the eligibility of Marines for employment as Captains of Guns in H.M. Ships. A proportion of Marine Captains of Guns will in future be allowed in the complements of all Battleships and such First Class Cruisers as are Flagships; and a new auxiliary rating of Second Captain of Gun

has been established by Order in Council for men of the Marine Infantry with an additional allowance of one penny per diem while borne on ships' books for the duty.

Musketry.—Twenty per cent. of the men on shore qualified as marksmen, 75 per cent. reaching the next stage of efficiency.

Reserve of Officers.—During the past year attention was directed to the fact that no specific regulation existed under which Retired Marine Officers could be recalled for service in case of emergency. A scheme has been prepared for the creation of a "Reserve of Officers, Royal Marines." It makes all officers who voluntarily retire liable to serve in this Reserve, those already on the Retired List or who may be retired compulsorily having the option of joining if under 50.

Reserve of Men.—Taking advantage of the powers given to the Admiralty by the Naval Reserve Act of 1900, to raise and keep up a new Division of Reserves in addition to the men already authorised under the Act of 1859, steps were taken to incorporate in the new force a reserve of Royal Marines, and the raising of this Reserve is now in course of operation.

Naval Reserves.

Executive Officers.—The establishment is fixed at 1,500, and there are now borne 436 Lieutenants, 517 Sub-Lieutenants, and 547 Midshipmen. Vacancies for Executive Officers are filled up as soon as they occur. There are no vacancies at present, and 330 qualified candidates are on the list of applicants for appointment.

The total number of Executive Officers now on the Active List who have served for 12 months or more in the Navy, or are now undergoing 12 months' training, is 295, an increase of 28 since last year.

Engineers.—The establishment of Engineer Officers is fixed at 400 and is complete. There are 15 candidates on the list of applicants for appointments.

The Instructional Courses for Engineers in the Home Dockyards, commenced in 1898, have been continued. Three courses of six Officers have been held each year, and arrangements are now being made to increase the number to 18 Officers for each course, or a total of 54 per annum. Thirty-two Officers have been through the courses, and they have been satisfactorily reported on for conduct and attention. These Officers appreciate the instruction and experience afforded.

Seamen.—On the 31st December last the total number of seamen borne, as compared with the numbers voted, was:—

Class.	Number Voted, 1900–1.	Numbers Borne.	
		31.12.00.	31.12.99.
Qualified Seamen.	11,700	2,937	2,080
1st Class, old system		7,978	8,921
Seamen	11,300	4,218	3,406
2nd Class, old system . . .		5,996	7,555
Totals	23,000	21,129	21,962

	1900.	1899.
Numbers embarked for six months' Naval training	784	980

The falling off in numbers borne and in those embarking for naval training, is attributed to the unpopularity of this compulsory training owing to insufficient pay as compared with what the men earn at their proper vocations (fishing, yachting, merchant ships, &c.), and the length of time required to serve, which interferes with their employment. Arrangements are being made to readjust the pay and to reduce the period of training from six to three months, which it is hoped will induce more men to embark. Further, this embarkation will not be compulsory, except as regards earning promotion and future pension, and men who do not qualify for promotion to "Qualified Seamen" will be allowed to re-enrol as "Seamen" for a second and third period of five years, which at present is not allowed. We regret this unavoidable diminution of the training period; but it is believed that a readjustment of the system of instruction will go far to neutralise the loss of time.

The negotiations for the establishment of a branch of the Royal Naval Reserve in the North American Colonies, to which reference was made in last year's Statement, have been proceeded with, and 50 seamen from Newfoundland have been embarked in His Majesty's ships on the Station for six months' training.

Firemen.—During the year 1900 there were 337 Firemen enrolled as compared with 544 in 1899, being a decrease of 207.

The numbers borne as compared with the numbers voted are:—

Borne, 31st December 1900	. 3,530	Voted	.	3,600.
" " 1899	. 3,494	"	.	3,500.

Drill Ships and Batteries.—The process of replacing the old M.L. guns by modern Q.F. guns is being continued, and arrangements are in hand to supply several 5-in. B.L. (converted to Q.F.) and Maxim guns during the forthcoming financial year.

Changes in Composition of Fleets.

China.—The China Fleet has been considerably increased during the past 12 months. The Dido, Isis, and Astraea from the Mediterranean, the Arethusa from the Pacific, the Wallaroo, Mohawk, and Lizard from Australia, and the Marathon from the East Indies, were all sent to that Station during the disturbances last year for temporary service. Of these, the Marathon has returned to her Station, the Dido and Isis have been replaced by other Cruisers in the Mediterranean, and will remain in China; the Mohawk has been replaced in Australia, and is now returning home. The Glory, Argonaut, and two Destroyers (Otter and Janus) have been added to the Fleet in Chinese waters, and the Ocean left Malta 2nd February to join them. The Robin, River Gunboat, has been commissioned for service in the West River, and the steamer Pioneer has been purchased and will be fitted as a gunboat for service on the Yangtse Kiang.

Mediterranean.—Eight Destroyers and four first-class Torpedo Boats have been added to the Mediterranean Fleet. The Hood has replaced the Ocean sent to China.

Home.—A Torpedo Gunboat (fitted with water-tube boilers) has been attached to each Home Port for the instruction of Engine Room Ratings in water-tube boilers.

The additions to the sea-going Fleet in Commission, enumerated above, involved complements to the extent of 7,269 Officers and Men.

It is worthy of note that these ships have been commissioned without reducing the personnel at Home below the strength required for mobilisation of the Ships in Reserve, without any interruption or diminution of the work of the various Schools and Training Establishments, and without drawing upon any of the Naval Reserve Forces. The ordinary reliefs on foreign stations, which were due during the latter portion of the year 1900, had unavoidably to be delayed, but are all now either being or about to be carried out.

Naval Brigades.—All Naval Brigades serving on shore in South Africa had returned to their ships by October, 1900.

A Naval Brigade participated in the International advance to Pekin, and, on the occupation of the city, returned to their ships.

The Government of South Australia offered the services of the South Australian Gunboat Protector for service in China during the disturbances of last year. The offer was accepted for four months, and the Protector served in China from September till the end of November. The Commander-in-Chief reported that the Protector was most useful, being an efficient and well kept man-of-war, reflecting credit on captain, officers, and men.

The Governments of New South Wales and Victoria similarly offered the services of Colonial Naval Brigades, consisting respectively of 300 and 200 officers and men for service in China. These offers were accepted, and the Brigades have been employed on shore under the General where they did good service. They will return home by the end of March.

Losses.—The Second Class Cruiser Sybille went ashore at Lambert's Bay, in Cape Colony, on 16th January, and is reported to be a total wreck. One life was lost. The Report of the Court Martial has not yet arrived. The Hind, Coast Guard Cruiser, was wrecked on the East Coast of England in November. No lives were lost. The River Gunboat Sandpiper sank during a typhoon at Hong Kong in November, but was successfully raised. One life was lost.

Manœuvres.—The annual Manœuvres took place, 49 ships and torpedo boats being specially commissioned for the purpose. Altogether 115 ships and vessels took part in the Manœuvres, and over 30,000 officers and men. The total number of Coast Guard embarked was 45 officers and 1,711 men, and of Royal Naval Reserves, 35 officers and 390 men.

Coaling of the Fleet.

In order to facilitate the departmental administration of this service a slight change has been made in the Navy Estimates, whereby all incidental expenses, including craft, machinery, &c., are provided for under the same subhead as the cost of the coal and its conveyance (Vote 8, Section 2, Subhead K). The works and buildings connected with coaling have also been grouped in one subhead of Vote 10.

Steps are in progress to organise and improve the coaling facilities at the several Naval Stations to ensure that the requirements of the Fleets can at all times be amply met. It is proposed to include the provision for the necessary expenditure in the forthcoming Naval Works Loan Bill.

Additions have been made to the coaling craft, and provision is included in the Estimates for 1901-2 for further floating craft to be

equipped with modern appliances. Provision is also made for the increase of reserve stocks of coal at certain Naval Stations abroad. The supervision of coaling duties at certain of the Naval Depôts has been strengthened.

The system of supplying coal to Fleets and Naval Stations by colliers under Admiralty control or under the orders of the Commanders-in-Chief is working well, and will be extended as far as circumstances permit.

The experiments with Patent Fuel have been satisfactorily concluded, and suitable quantities will be stored to form adequate reserves at foreign stations.

Schemes for further trials with Liquid Fuel have been considered, and some manufacturers have undertaken to submit designs and particulars of trials. Two of these plans are about to be tried, one with a marine water-tube boiler on shore, and one, if the arrangements are suitable, on board H.M.S. Surly.

Naval Training.

The training of officers and men has received and is receiving much attention from the Board.

The report of a Committee on the Training and Examination of Junior Officers, which was appointed in 1897, and the circular in which its recommendations have been embodied and issued to the Fleet, will be laid before Parliament. Sufficient time has not elapsed to show the result of the changes introduced, but any modifications shown to be necessary by experience will be adopted.

Special encouragement is being given to the better study of foreign languages; the seamanship examination has been revised by the Council of Education to meet the present conditions obtaining on modern warships; promotion to the rank of Lieutenant will not in future depend only upon success in examinations, but a certificate will be required to be obtained by every Sub-Lieutenant from his Commanding Officer after six months' service in a ship of war at sea as to his fitness to take charge of a watch at sea and to perform efficiently his other duties as a Lieutenant.

A Naval Strategy course, including therein Strategy, Tactics, Naval History, and International Law, has been commenced at Greenwich for the benefit of the Senior Officers at the Royal Naval College, and is being conducted by the Captain of the College. The Tactical courses at Portsmouth are being continued. All the officers going through these courses have been placed on full pay.

The Council of Naval Education has been directed to carefully scrutinise the Greenwich course with a view to ascertaining whether the matter and period of study of the Gunnery and Torpedo Lieutenants is that most adapted to the efficiency of the Service.

The system of training the men of the Navy is being constantly watched and revised with a view to increased efficiency. Great stress is being laid on efficiency in coaling; special arrangements have been made for training the stokers in the depôts in the stoking of water-tube boilers. A scheme has been matured, and is now under consideration for transferring a large proportion of the instruction in gunnery from the Gunnery Schools to the sea-going Fleet, and for confining the further education in the Gunnery Schools to those seamen who show special aptitude, and who may, therefore, be selected for the advanced ratings of Captains of Guns and Captains of Turrets, or for the higher Torpedo ratings. There is no doubt but that the standard of proficiency in gunnery is steadily rising in the Navy. A large addition of practice ammunition for the Fleet was sanctioned in 1899, and a seagoing gunnery ship has been allotted to each of the Gunnery Schools, and will be attached as soon as ready.

NEW CONSTRUCTION.

There has been no relaxation of activity in shipbuilding and engineering operations generally during the past year, better progress having been made than in recent years with the ships under construction for the Royal Navy, and it is anticipated that the aggregate expenditure on new construction will closely approach the provision made in the Estimates, and will largely exceed that of any previous year.

The steps taken by the various contractors to increase the output of armour and machinery have begun to show their effect, and the rate of progress has greatly increased during the latter half of the year. This is especially the case with armour, the total output of which for Admiralty use in the present year will be from 45 to 50 per cent. greater than last year. The rate of delivery during the latter half of this year indicates that the new plant is now in effective working order. Moreover, a fifth firm has undertaken armour manufacture, and has advanced considerably with the necessary plant. The outlook in regard to the future supply of armour is, therefore, favourable.

The total output of new construction in the financial year now drawing to a close will probably exceed that of 1899-1900, which was previously the greatest on record, by about a million.

Battleships.

The Glory has been completed and commissioned. The Albion has been delivered, and has commenced her trials, but I regret to say that defects in her machinery have been discovered which have postponed her completion.

The Vengeance, the last ship of the Canopus class, has been detained at Barrow in consequence of an accident to the entrance of the dock in which the ship was being completed. It is now reported that the works on the dock entrance are being rapidly pushed forward, and that they will probably be sufficiently advanced to permit the ship to pass out during April. Her trials and completion will be accelerated as much as possible after delivery.

The six battleships of the Formidable class, which were in hand in the dockyards at the beginning of the present financial year, have been considerably advanced, and two similar ships (the Queen and Prince of Wales) have been commenced. The Implacable has commenced her steam trials, and will be practically completed by the end of the financial year; her gunnery trials will probably be made rather later. It is anticipated that the Formidable and Irresistible will be completed early in the next financial year, and the Bulwark about December next. The London and Venerable will probably be finished about May 1902.

The six vessels of the Duncan class have also been well advanced. Of the four building by contract, the Russell has been launched and the Duncan will be launched on March 21st, and the other two are very nearly in the same stage of progress. The Albemarle and Montagu, building in the dockyards, are to be launched on the 5th of March. All these vessels should be completed in 1902–3.

Armoured Cruisers.

Twenty vessels are now in course of construction; six of the Cressy class, four of the Drake class, and ten of the Monmouth class.

The Cressy has been delivered within the contract date, and has satisfactorily completed her steam trials, exceeding her estimated maximum speed by nearly half a knot. Satisfactory preliminary trials have been made with the new type of mounting for her 9·2-in. guns, and the ship is now being prepared for service. Her gunnery trials will be carried out early in the next financial year.

The Sutlej has been delivered and the Aboukir will be delivered during the present financial year. Both ships will be made ready for trials immediately.

The completion of the Hogue at Barrow has been delayed by the same accident that has affected the delivery of the Vengeance. The contractors are now making special arrangements to press forward the work on the ship.

The Bacchante has been launched, and the Euryalus is the only vessel of the class remaining on the building slips. Her launch has been deferred in consequence of the accident to the dock entrance at Barrow.

One vessel of the Drake class (the Good Hope) has been launched, and the Drake is to be launched before the present financial year closes. Equally satisfactory progress has not been made hitherto on the other two vessels of this class building by contract, but the contractors have been urged to make greater efforts, and have undertaken to do so.

Four of the vessels of the Monmouth class which were commenced last year have been considerably advanced. The first of these (the Kent) will have been launched before the close of this financial year, and two others will probably be launched about May next, and the fourth about August.

The remaining six vessels have been commenced recently and the work on them will be advanced, before the present financial year closes, to a stage which will enable rapid progress to be made on them next year.

It will be seen from the above that four battleships and four armoured cruisers are expected to be launched during the last two months of this financial year.

Protected Cruisers.

The contractors' steam trials of the first-class cruiser Spartiate were not satisfactory, and the completion of the ship has been delayed by the necessity for replacing a condemned crank shaft.

The two second-class cruisers of improved Hermes type (Challenger and Encounter) referred to in the Statement of last year have been commenced in the Dockyards. They are not sheathed with wood and copper, and are about a knot faster than the Hermes class. One of these classes is to be fitted with Babcock & Wilcox boilers.

Only one third-class cruiser (the Pandora) has been in hand during the year. Her steam trials have still to be completed, but it is anticipated she will be practically ready for service at the close of the present financial year.

Sloops and Gunboats.

Eight sloops have been under construction during the year, six in the Dockyards and two by contract. The delivery of the latter has been considerably delayed, and they will not be completed as was anticipated this financial year. Two of the dockyard-built vessels will be completed this year, and two others will be finished next summer, when the contract-built ships should also be finished.

The remaining two vessels (Odin and Merlin) have been commenced at Sheerness during the present year.

Two gunboats of extremely light draught (the Teal and Moorhen) have been begun this year and are now well advanced. The work has been hindered by difficulties with material for boiler tubes, but it is anticipated that the vessels will be finished early in the next financial year.

Torpedo-boat Destroyers.

The total number of vessels in this class is now 113. Forty-two have trial speeds of 26 to 27 knots, and the whole of these have been completed and accepted. Four of this type, which were originally completed with locomotive boilers, have now been fitted with water-tube boilers, and the whole of the 113 torpedo boat destroyers now have water-tube boilers of the small tube or Express type.

Of the 30-knot vessels 58 have been delivered, of which two have not yet passed their trials, and the eight still remaining in the builders' hands are well advanced, one having passed her official trials and two others being now under trial.

Of the five Destroyers with trial speeds of over 30 knots, two have been delivered and have completed their trials, viz., the Albatross, which attained 31½ knots speed on trial, and the Viper, fitted with Parsons' Steam Turbine, which attained on trial a speed of over 33¾ knots, combined with an almost entire absence of vibration. The Cobra, which has similar machinery to that in the Viper, was tried with a load on board largely in excess of that usually carried on speed trials by Destroyers, and maintained for three hours a speed slightly above 30 knots.

A fourth vessel, of 32 knots' speed, is expected to commence her preliminary steam trials about June next.

The fifth vessel (of 33 knots' contract speed) has undergone a very long series of trials with propellers of varying dimensions, but the builders have not up to the present succeeded in attaining the guaranteed speed, and consequent delay in completion has resulted.

At the close of this financial year there will be 10 Destroyers ordered previously to 1900–1901 still undelivered, but five additional

vessels, not included in the original Estimates for the year, were purchased under an additional Estimate while in course of construction, and these will be delivered this financial year.

Torpedo Boats.

The two Torpedo Boats of 25 knots trial speed, ordered in 1899, are well advanced. The first will shortly commence her preliminary trials. The further two of the same type ordered this year are also well advanced, and it is expected that all four will have been delivered and tried by September next.

Royal Yacht.

The alterations in this vessel which were mentioned as necessary in last year's Statement have been made, and she has satisfactorily completed her steam trials during the year. These trials included three of 48 hours each, one at 5,000 horse-power, and two at 7,500 horse-power; and one trial of eight hours at 11,000 horse-power. All the trials were carried out with complete success, the engines working with great smoothness and an almost complete absence of vibration. The maximum speed obtained was 20½ knots, instead of the 20 knots promised in the design; and on two occasions the vessel ran at a speed of about 18½ knots for 48 hours continuously.

Experiments made since the alterations show that the vessel will have ample stability, and her behaviour during her trials when experiencing a very strong breeze and considerable sea was very satisfactory.

The work of completing her internal decoration and fittings is now in hand.

Fleet Auxiliaries.

The provision of fleet auxiliaries is under the careful consideration of the Board. Three colliers are now working with the Fleet; a repairing and distilling ship has been purchased and is now being fitted up; provision is made in the Estimates for another distilling ship and for a depôt ship, while it is expected that the Maine will, with the kind assistance of the Committee of American ladies and the owner, be secured for service as a hospital ship in the Mediterranean during the ensuing summer.

Royal Naval Reserved Merchant Cruisers.

During the year a new arrangement has been made with nearly all the great steamship companies, by which their finest vessels are held at the disposition of the Admiralty for employment as Armed

Cruisers when required. Under the previous agreements only the Cunard, White Star, Peninsular and Oriental, and Canadian Pacific Railway Companies were included. To these have now been added the Orient, Royal Mail, and Pacific Companies. Eighteen of the largest and swiftest passenger steamers belonging to these companies will receive an annual subvention, and thirty steamers in addition are held at the disposition of the Admiralty without further subsidy. In the main features the new agreements will be similar to former agreements, but in some particulars, modifications have been made based on experience.

Experiments.

During the year a number of experiments have been made on armour plates with a view to improvements in manufacture, or to the selection of the quality of armour best adapted for particular services.

An important firing trial was also carried out against H.M.S. Belleisle, and much valuable information was obtained which will be of service in future naval construction.

Submarine Boats.

Five submarine vessels of the type invented by Mr. Holland have been ordered, the first of which should be delivered next autumn.

What the future value of these boats may be in naval warfare can only be a matter of conjecture. The experiments with these boats will assist the Admiralty in assessing their true value. The question of their employment must be studied, and all developments in their mechanism carefully watched by this country.

Machinery and Boilers.

Between the preparation of last year's Statement and 31st March, 1900, the battleship Glory and the sloop Condor completed their contractors' trials, and the former vessel is now on the China station.

The following vessels have completed their contract steam trials during the present financial year:—

First-class cruiser—Cressy. Sloops—Vestal and Shearwater. Torpedo-boat destroyers—16 in number. Royal yacht—Victoria and Albert.

In addition, the battleships Albion, Implacable, the first-class cruiser Spartiate, the third-class cruiser Pandora, the sloop Mutine, and four torpedo-boat destroyers have commenced their trials.

The battleships Bulwark and Formidable and armoured cruiser Sutlej will be ready for trials early in the next financial year.

The third-class cruiser Blanche has been re-boilered, the double-ended cylindrical boilers being replaced by water-tube boilers of the small-tube type. She has completed her trials satisfactorily, and is now on foreign service. The sister vessel Blonde is now in hand for similar alterations.

The torpedo-gunboats Niger and Gossamer are being re-engined and re-boilered, with small-tube water-tube boilers, associated with light quick-running engines. This is following on a similar course to that adopted last year with Skipjack and Speedwell, and provides an increase in the I.HP. developed in the vessels from 3,500 to 6,000.

The torpedo-boat destroyers Havock, Hasty, and Charger have had their locomotive boilers replaced by small-tube water-tube boilers, and the Havock has satisfactorily completed her trials with the new boilers.

The torpedo-gunboat Seagull, recently fitted with water-tube boilers of the Niclausse type, has satisfactorily completed an exhaustive series of sea-going trials similar to those carried out in the Sharpshooter (Belleville) and Sheldrake (Babcock and Wilcox) during the preceding year.

These comparative trials in three similar ships have furnished valuable information regarding the different types of boilers; and as a result it has been decided to continue them on a larger scale, and boilers of the Babcock and Wilcox pattern have accordingly been ordered for the new second-class cruiser Challenger and the sloop Odin; the sloop Espiègle was ordered to be fitted with these boilers in 1899–1900, and she will be ready to commence her steam trials early in the ensuing financial year; and Niclausse boilers are to be fitted in the first-class cruiser Suffolk and in the sloop Merlin.

The second-class cruisers Highflyer (Belleville boilers) and Minerva (cylindrical boilers) carried out a series of comparative trials; the results of which were embodied in a Parliamentary Return.

The Boiler Committee appointed by Lord Goschen commenced their sittings in September last, but their experiments have not been concluded. The Minerva and the second-class cruiser Hyacinth (Belleville boilers) have been placed at the disposal of the Boiler Committee for comparative experiments. The Minerva's trials have commenced.

At the special request of the Board, an ad interim report has just been presented by the Committee in reply to certain specific questions specially addressed to it. This report will be laid before Parliament, and all outstanding orders for boilers will be immediately reconsidered, and, if necessary, revised in the light of the information afforded by this report.

The torpedo-boat destroyers Viper and Cobra, whose propelling machinery is of the turbine type, have completed their contract trials, obtaining high speeds. They will be further tested on service as soon as practicable. There are still many points connected with this system of propulsion which require experimental investigation.

Dockyards.

Satisfactory progress has, on the whole, been made during the current year on New Construction in the dockyards. It is anticipated that, despite some delays which have occurred in deliveries of armour, and work on propelling machinery, and the large amount of repairing work performed on ships in reserve, the amounts voted for labour and issue of ordinary materials will in almost every respect be fully realised. Every endeavour is being made to attain this result.

The number of men employed in the dockyards has been gradually increased during the year to meet the additional work thrown on them by the growth of the fleet.

The number of workmen borne in the home dockyards on the 1st April, 1900, and on the 1st January, 1901, are as follows:—

April, 1900	28,833
January, 1901	30,330
Increase	1,497

This increased number includes about 690 dockyard and naval artificer apprentices who were entered in July, 1900.

Large Repairs during 1900–1901 at Home Dockyards.

The following ships have been or will be completed in the yards:—

Amphion.	Immortalité.
Anson.	Impérieuse.
Beagle.	Iphigenia.
Blanche.	Lapwing.
Camperdown.	Narcissus.
Eclipse.	Nymphe.
*Garnet.	Pallas.
Grafton.	Pegasus.
Harrier.	Rattler.
Hawke.	Revenge.
Hazard.	*Ruby.
Hebe.	Sparrow.
Hood.	Talbot.
Hussar.	*Tourmaline.

* Converting into coal hulks.

The following ships are now in hand, or their refit will be commenced during 1900–1901 :—

Barrosa.	Melpomene (if decided to proceed with refit).
Blonde.	Peacock.
Doris.	Pearl.
Europa.	Pheasant.
Fearless.	Powerful.
Hecate.	Swallow.
Hermes.	Venus.
Leander.	

The details of the repairs and refits to be carried out in 1901–1902 appear in the Appendix to the Navy Estimates. The principal items of work to be undertaken in this section are :—

*Audacious.	Mohawk.
Barfleur.	Porpoise.
Centurion.	Spider.
Howe.	Tartar.
*Invincible.	Undaunted.

* Conversion into bases for Torpedo Boat Destroyers.

New Shipbuilding Programme.

We propose to lay down in the coming financial year—

3 Battleships.
6 Armoured Cruisers.
2 Third Class Cruisers.
10 Torpedo Boat Destroyers.
5 Torpedo Boats.
2 Sloops.
5 Submarine Boats (ordered and work commenced in 1900).

Of these 2 Battleships, 1 Armoured Cruiser, and 2 Sloops will be built in the Royal dockyards. The rest will be built by contract.

The total Vote proposed for New Construction is £9,003,256, of which £8,465,406 will be devoted to pushing forward the ships already in hand to the utmost of our power and to work on the submarine boats, and £537,850 to starting work on the additional ships to be commenced. The object aimed at in this distribution of the money is to advance the work on the many ships now under construction as far as possible towards completion, and to place the ships to be newly commenced into such a position that the utmost possible amount of work can be put into them in 1902-3.

The arrears in the delivery of hulls, armour-plates, guns, gun-mountings, and machinery has been a continual source of anxiety equally to the last and the present Board. The financial position of

Messrs. Maudslay and of Messrs. Earle greatly contributed to the difficulties experienced in the deliveries of machinery. A Committee has been appointed to thoroughly investigate the causes of the arrears in every case, and to advise how a recurrence of the evil can best be obviated. The Committee consists of Mr. H. O. Arnold Forster, M.P., Rear-Admiral A. K. Wilson, C.B., V.C., Sir Thomas Sutherland, G.C.M.G., and Sir Francis Evans, K.C.M.G.

Naval Ordnance.

The amount required under the Naval Ordnance Vote is larger than the original Vote for 1900–1901 by £915,000. An additional Estimate of £753,200, was, however, taken under this Vote during the year, so the net increase over 1900–1901 is £161,800.

A sum of £420,000 is included in the Estimate in practical completion of the policy of increasing the reserves of guns and ammunition.

Provision is also included for the continuation of the issue of armour-piercing shell to the Fleet.

Deliveries of the new design of 12-in. B.L. wire gun have been made, and these guns are now mounted in the battleships of the Formidable class.

Some delay has occurred in the completion of the new 9·2-in. B.L. guns, as the trial of the first gun showed that a slight modification of design was necessary. Deliveries are, however, now being made, the first two guns having been mounted in H.M.S. Cressy, and it is hoped that the guns for succeeding ships will be ready by the time they are required.

A new gun of 7·5-in. calibre has been tried satisfactorily, and has been approved.

A 5-in. B.L. gun has been converted to take the Welin breech screw, and the design has been approved.

Progress is being made each year with the re-armament of the Fleet with ·303-in. Maxims in lieu of the older patterns of machine guns.

Telescopic sights have been adopted for Q.F. guns, and the supply is proceeding.

A new design of mounting for the 9·2-in. gun has been tried during the past year with very satisfactory results.

As the result of experience gained in South Africa and China some modifications and additions are being made to the seamen's equipment for service on shore.

Wireless telegraph apparatus has been obtained and supplied to a certain number of ships at home and abroad.

NEW WORKS.

Works provided in Estimates.

Chatham.—Good progress has been made with the new building slip, shops, &c. The New Foundry will be completed early in next financial year.

Portsmouth.—Very satisfactory progress has been made with the new smithery connected with it, and it is expected the work will be completed during next financial year.

Devonport.—Good progress has been made with the new building slip; the shops will be commenced shortly.

Pembroke.—A contract has been made for the new smithery, and considerable progress has been made. It is expected that the work will be completed in 1901–1902.

Bermuda.—A contract has been made for the supply of the iron-work to be sent from England for the bridge between Somerset and Watford Islands. The excavation of a berth for the floating dock at Bermuda will probably not be completed till 1902.

Dredging.—The deepening of French Creek at Malta has been progressing, and a considerable amount of dredging has been done at Wei-hai-Wei.

Coaling Depots.—A new subhead has been introduced into Vote 10 in connexion with coaling arrangements generally at home and abroad. Good progress is being made with the works already started at Chatham.

Hospitals.—Progress continues to be made with the work of providing additional and improved hospital accommodation at home and abroad.

Naval Armaments.—The torpedo range at Portland is expected to be practically finished by the end of next financial year; the contract for the pier is nearly completed, and one for the superstructure has recently been made.

Progress under Naval Works Loan Acts.

Chatham.—Dock. A contract has been made, and the work is well in hand.

Colombo.—The new dock at this station is in hand, being built by the Colonial Government.

Malta.—Dockyard extension. A contract has been made for the new docks. Much subsidiary and preliminary work has also been carried out.

Bermuda.—Dockyard extension. Tenders for this contract are under consideration. Dredging on sites of wharf and breakwater preparatory to their construction has been in progress for some time.

Dartmouth.—Britannia Royal Naval College. A contract for the main building and sick quarters has been made. Much work has been done in making roads, &c.

Magazines.—Work is progressing satisfactorily; that at Portsmouth in particular being in an advanced condition. The scheme at Chatham comprises an entirely new establishment.

Hospitals.—The Infectious Hospital at Haulbowline is completed, and Haslar Hospital will be completed in 1901–1902.

Inclosure and Defence of Harbours.

Gibraltar.—The Admiralty Mole Extension was brought up to water-level throughout its whole length by 30th September, 1898. The quay wall on the harbour side of the Mole has been brought up to coping level for a distance of 2,358 feet. New coal sheds 750 feet in length have been completed on the Mole. The Detached Mole has been completed except portions of the upper structure and the round heads at the north and south extremities. On the Commercial Mole the reclamation and wharf wall are finished, and a portion of the new wharf has been opened for traffic. The northern arm is well advanced, and the viaduct and western arm are well in hand.

Portland.—The whole of the new breakwater was brought up to water-level on the 17th April, 1899, and the work is being increased to the full section. The facing of a portion of the breakwater has been commenced.

Dover.—Admiralty Pier Extension.—The excavation for the foundation has been executed for about 450 feet, and block setting is in progress. The foundation course has been laid for a length of 440 feet, and the blockwork has been completed for a length of 260 feet at low-water level. The work at the junction with the existing pier head has been carried up to within two courses of low water.

East Reclamation.—The wall is now practically complete to cope level for a length of about 1,250 feet. Considerable progress has been made with the filling at the back of the wall, and the eastern half of the blockyard is now being laid out.

East Arm and Root Wall.—Ten bays of the East Arm temporary staging have now been completed. Two goliaths, one 60 tons and one of 40 tons, are in use on this staging, and a second machine for 40 ton loads is in course of erection. About 400 feet of the

foundations have been completed in the Root Wall, and about 100 feet of the East Arm above low-water level; a considerable quantity of concrete-in-mass has been deposited, and some of the Root Wall blocks have been set.

Adapting Naval Ports to Present Needs of Fleet.

Deepening Harbours and Approaches.—The dredging is finished at Chatham and Haulbowline. The dredging of Portsmouth Harbour is still in progress. The removal of the Vanguard, Rubble Bank, and Cremyll Shoals at Devonport is completed. The dredging above Saltash Bridge is in hand.

Keyham Dockyard Extension.—Graving Dock No. 4. Side and end walls are complete. Excavation between the side walls is practically completed. Concreting under the floor is completed for a length of 375 feet.

Graving Dock, No. 5.—Excavation of rock is nearly completed, and setting of granite floor stones has been commenced.

Graving Dock, No. 6.—Good progress is being made in the excavation of the rock.

Entrance Lock.—The west wall is built to underside of coping for a length of 300 feet, and for the remaining length to level of 8 feet below coping. On site of floor and east wall the mud is being removed.

Closed Basin.—The North Wall is nearly completed, East Wall is completed. A length of 640 feet of West Wall has been constructed up to levels varying from 38 feet to 15 feet below coping. Excavation for Caisson Camber at entrance is in progress. Excavation of mud on site of basin has been continued.

Tidal Basin.—East and South Walls, also South Arm at entrances are completed.

Outer Wall.—The wall is in progress and has been built to level of 3 feet below coping for a length of 160 feet at South end.

Gibraltar Dockyard Extension.—The Reclamation is in progress; pile foundations are being driven, and the superstructures of the Chief Constructor's and Chief Engineer's shops are in hand. The excavation of the New Mole Parade and the retaining walls have been completed. The excavation of No. 1 Dock is in progress. The dam for No. 3 Dock is finished; the enclosed area is pumped dry and the excavation is in progress.

Hong Kong.—The contractors have commenced the work of constructing the dock, reclaiming land, providing wharf walls and a basin, and erecting additional shops.

Simon's Bay Dockyard Extension.—A tender has been accepted for this work. The necessary land has been acquired, and the houses on the property are being converted into quarters.

Naval Barracks, &c.

Chatham Naval Barracks.—The West Block of the Seamen's Quarters is nearly completed, and the two remaining blocks are well in hand. The Officers' Mess and the North and South Blocks of Officers' Quarters are approaching completion.

Sheerness Naval Barracks.—The proposal to build new barracks for the Gunnery School at Sheerness has been abandoned, as the only available site was found on examination to be unsuitable on sanitary grounds. Negotiations for a site at Chatham are in progress.

Portsmouth Naval Barracks.—The War Office have transferred the Anglesea Barracks and have arranged for the transfer of further land required on the site of the Military Hospital. One block of Seamen's Quarters is up to roof level; the second block is up to second-floor level, and the third block has been commenced.

Keyham Naval Barracks.—The eastern block of Seamen's Quarters is practically finished; the western block is nearly finished. The Officers' Mess and Quarters are roofed in.

Chatham Naval Hospital.—The work is in hand, and some of the buildings are up to first-floor level.

A Naval Works Loan Bill to provide during the next two years for certain new works and for the expenditure on works already authorised will shortly be introduced.

SELBORNE.

1st March, 1901.

Abstract of Navy

Votes.		Estimates, Gross Estimate.	Appropriations in Aid.
	I.—Numbers.		
A.	Total Number of Officers, Seamen, Boys, Coast Guard, and Royal Marines	118,625	....
	II.—Effective Services.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coast Guard, and Royal Marines	5,877,308	117,308
2	Victualling and Clothing for the Navy	2,389,539	497,239
3	Medical Establishments and Services	239,913	20,913
4	Martial Law	16,281	81
5	Educational Services	129,479	28,879
6	Scientific Services	86,259	20,459
7	Royal Naval Reserves	292,236	136
8	Shipbuilding, Repairs, Maintenance, &c.:		
	Section I.—Personnel	2,696,815	12,815
	Section II.—Matériel	5,481,500	175,000
	Section III.—Contract Work	6,757,920	72,420
9	Naval Armaments	3,984,255	64,555
10	Works, Buildings, and Repairs at Home and Abroad	1,043,100	20,000
11	Miscellaneous Effective Services	375,604	16,104
12	Admiralty Office	288,600	9,000
	Total Effective Services . . . . £	29,658,809	1,054,909
	III.—Non-Effective Services.		
13	Half-Pay, Reserved, and Retired Pay	803,154	12,254
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,162,009	21,909
15	Civil Pensions and Gratuities	341,001	401
	Total Non-Effective Services . . £	2,306,164	34,564
	IV.—Extra Estimate for Services in connection with the Colonies.		
16	Additional Naval Force for Service in Australasian Waters—Annuity payable under	..	..
	Grand Total . . . . £	31,964,973	1,089,473

Note.—Under an Act of the Cape of Good Hope Legislature, entitled, "The Navy Contribu-
contribution towards the annual expenditure by the Imperial Government in connection with
A gift of 12,000 tons of coal for the use of His Majesty's Ships, etc., is made annually by the

Estimates for 1901-1902.

1901-1902.	Estimates, 1900-1901.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers. 118,625	114,880	....	Total Numbers. 114,880	Numbers. 3,745	Numbers.	A.
£	£	£	£	£	£	
5,760,000	5,643,016	116,016	5,527,000	233,000	....	1
1,892,300	2,186,175	470,875	1,715,300	177,000	....	2
219,000	230,175	21,375	208,800	10,200	....	3
16,200	13,320	20	13,300	2,900	....	4
100,600	120,744	28,444	92,300	8,300	....	5
65,800	81,185	14,285	66,900	....	1,100	6
292,100	271,213	113	271,100	21,000	....	7
						8
2,684,000	2,524,815 (a) 11,000	12,815	2,512,000 11,000	161,000	....	Sec. I.
5,306,500	4,248,000 (a) 55,100	164,000	4,084,000 55,100	1,167,400	....	Sec. II.
6,685,500	6,367,055 (a) 410,000	38,055	6,329,000 410,000	....	53,500	Sec. III.
3,919,700	3,060,008 (a) 753,200	55,308	3,004,700 753,200	161,800	....	9
1,023,100	865,800 (a) 40,000	20,000	845,800 40,000	137,300	....	10
359,500	281,912	10,712	271,200	88,300	....	11
279,600	276,100	9,000	267,100	12,500	....	12
28,603,900	26,169,518 (a) 1,269,300	961,018	25,208,500 1,269,300	2,180,700	54,600	
790,900	798,972	12,272	786,700	4,200	....	13
1,140,100	1,145,550	21,950	1,123,600	16,500	....	14
340,600	343,882	382	343,500	....	2,900	15
2,271,600	2,288,404	34,604	2,253,800	20,700	2,900	
....	95,300	35,000	60,300	....	60,300	16
30,875,500	28,553,222 (a) 1,269,300	1,030,622	27,522,600 1,269,300	2,201,400	57,500	

Net Increase £2,083,600

(a) Additional Estimate, 13th July 1900 (Parliamentary Paper, No. 270).

tion Act, 1898," a sum of £30,000 is paid annually out of the public revenue of that Colony as a
His Majesty's Naval Service.
atal Government.

STATEMENT showing the Actual and Estimated EXPENDITURE for NAVAL SERVICES for the Three Years ending the 31st March, 1902.

		£	s.	d.
1899–1900.	Estimated Expenditure (after deducting Appropriations in Aid)	£26,594,500	0	0
	Net Expenditure, as per Final Account	25,731,220	9	6
	(Expenditure less than Estimate)	£863,279	10	6
1900-1901.	Estimated Expenditure (after deducting Appropriations in Aid)	£27,522,600	0	0
	Additional Estimate (13th July, 1900)	£1,269,300	0	0
		£28,791,900	0	0
1901–1902.	Estimated Expenditure (after deducting Appropriations in Aid)	£30,875,500	0	0

STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1900–1901 and those for 1901–1902.

		£
INCREASES.		
Wages, &c., of Officers, Seamen, and Marines		233,000
Victualling and Clothing		177,000
Medical Establishments and Services		10,200
Martial Law		2,900
Educational Services		8,300
Royal Naval Reserves		21,000
Wages, &c., of Men in Dockyards		191,983
Naval Stores		1,014,900
Propelling and Auxiliary Machinery for His Majesty's Ships and Vessels (Contract)		187,155
Purchase of Ships and Vessels		29,000
Repairs and Alterations by Contract of Ships, &c.		22,468
Inspection of Contract Work		8,000
Machinery for Shore Establishments (Contract)		115,000
Wages of Artificers and Crews of Vessels (Naval Ordnance Establishments)		27,547
Projectiles and Ammunition		140,050
Small Arms and Miscellaneous Naval Ordnance Stores, &c.		48,300
Inspection, Proof, Experiments, and Freight (Naval Ordnance Stores)		29,000
Works, Buildings, and Repairs		137,300
Miscellaneous Effective Services (Passage Money, &c.)		88,300
Non-Effective Services		17,800
Miscellaneous Items		32,655
		2,541,858
DECREASES.	£	
Scientific Services	1,100	
Hulls of Ships (Contract)	190,201	
Gun Mountings (Contract)	39,670	
Royal Reserve of Merchant Cruisers	55,887	
Guns	76,100	
Cessation of Annuity payable under the Australasian Agreement (Imperial Defence Act, 1888)	95,300	
		458,258
Net Increase		£2,083,600

Statement showing the Total Estimated **Expenditure** for the **Naval Service**, including Amounts provided in the **Navy Estimates**, as well as in the **Civil Service** and other **Estimates**, for the following Services:—

———		1901–1902.	1900–1901.
Navy Estimates:		£	£
Estimated Expenditure (after deducting Appropriations in Aid)		30,875,500	27,522,600 1,269,300 (a)
Civil Service Estimates:			
Estimated Expenditure under—			
Class I. Vote 8.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c.	4,460		
Rents, Insurance, Tithes, &c.	8,000		
Fuel, Light, Water, &c.	4,400		
Furniture	2,400		
Removal into and furnishing New Block of Admiralty Extension	2,500 (b)		
		21,760	29,900
Class I. Vote 9.—Surveys of the United Kingdom		200	200
„ I. „ 12.—Rates on Government Property		98,800	88,800
„ I. „ 13.—Public Works and Buildings, Ireland:			
Coast Guard, viz.:	£		
Purchase of Sites	625		
New Works and Alterations, including Naval Reserve Stations	10,518		
Maintenance and Supplies	5,342		
	£16,485		
Naval Reserve, viz.:			
Maintenance and Supplies	155		
		16,640	10,470
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,466	3,380
„ II. „ 9.—Mercantile Marine Services:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		2,450	2,450
„ II. „ 14.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts	7,865		
Expense and Manufacturing Accounts	4,932		
Store Accounts	5,539		
		18,336	17,506
Class II. Vote 23.—Stationery and Printing		74,000	71,000
„ III. „ 1.—Law Charges, England		5,380	3,080
Maintenance of Naval Prisoners:			
„ III. „ 7.—Prisons, England and the Colonies		5,980	4,928
„ III. „ 13.—Prisons, Scotland		105	100
„ III. „ 20.—Prisons, Ireland		100	59
Revenue Department Estimates:			
Vote 1.—Customs.—Percentage for provision of funds for District Paymasters of the Coast Guard		122	142
Vote 1.—Customs.—Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,261	3,261
Vote 2.—Inland Revenue.—Analysis of Food, &c.		120	100
Vote 3.—Post Office.—Postage of Official Correspondence (including Parcels)	£ 15,504		
Vote 5.—Post Office Telegraphs.—Official Telegrams and Expenses in connection with Telegraphs (Admiralty Wires, and Services of Clerks)	18,263		
		33,767	29,744
Total	£	31,159,987	27,787,720 1,269,300 (a)

Note.—In addition to the Services shown above, an annuity of £16,243 18*s.* is payable to the Commissioners of Woods, &c., from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

(a) Additional Estimate, 13th July, 1900. (b) Part re-vote.

VOTE (A.)

NUMBERS of OFFICERS, SEAMEN, BOYS, and ROYAL MARINES, Borne on the Books of His Majesty's Ships, and at the ROYAL MARINE DIVISIONS.

One Hundred and Eighteen Thousand Six Hundred and Twenty-five.

I.—SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1901–1902.		1900–1901.		Numbers of all Ranks borne on 1st January, 1901.
Vote 1	**FOR HIS MAJESTY'S FLEET**					
	Flag Officers	15		15		
	Commissioned Officers	3,754		3,628		
	Subordinate Officers	852		806		
	Warrant Officers	1,501		1,413		
	Petty Officers and Seamen	75,501		73,259		
	Boys (Service)	3,700		3,700		
			85,323		82,821	81,179
	COAST GUARD.					
	Commissioned Officers	89		89		
	Chief Officers of Stations	238		237		
	Petty Officers and Seamen	3,873		3,874		
			4,200		4,200	4,107
	ROYAL MARINES (for Service Afloat and on Shore).					
	Commissioned Officers	471		444		
	Warrant Officers	33		32		
	Staff Sergeants and Sergeants	1,417		1,361		
	Buglers and Musicians	647		620		
	Rank and File	17,022		16,133		
			19,590		18,590	18,368
	Total		109,113		105,611	103,654
	Net Increase		3,502			

II.—OTHER SERVICES.

Vote 1	Naval Cadets	260		260		
	Engineer Students	180		178		
	Pensioners in Home Ships and in the Reserves	1,048		987		
	Boys under Training	6,200		6,200		
			7,688		7,625	7,015
Other Votes	Various Services	..	1,824	..	1,644	1,586
	Total		9,512		9,269	8,601
	Net Increase		243			
	Total, Sea Service	109,113		105,611		
	„ other Services	9,512		9,269		
			118,625		114,880	
	Net Increase		3,745			

Including Officers and Seamen	1,621	—	1,531
„ Pensioners (Vote 1)	1,041	—	987
„ Pensioners (other Votes)	15	—	16
„ Boys (Training, Seaman Class)	6,200	—	6,200
„ Boys (Training, Artisans)	420	—	320
„ Royal Marines	215	—	215
	9,512	—	9,269

VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1902, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Two Million Six Hundred and Eighty-Four Thousand Pounds.

(£2,684,000.)

SECTION II.—MATÉRIEL.—Five Million Three Hundred and Six Thousand Five Hundred Pounds.

(£5,306,500.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Six Million Six Hundred and Eighty-five Thousand Five Hundred Pounds.

(£6,685,500.)

I.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

	ESTIMATES. 1901–1902.	ESTIMATES. 1900–1901.	Increase.	Decrease.
	£	£	£	£
DOCKYARD WORK.				
SECTION I.—PERSONNEL.				
Dockyards at Home.				
A.—Salaries and Allowances . . .	(a) 185,751	178,562	7,189	..
B.—Wages, &c., of Men, and hire of Teams	2,096,520	1,945,392 (b) 11,000	140,128	..
C.—Wages, &c., of Police Force . .	43,786	41,040	2,746	..
D.—Contingencies	7,000	6.600	400	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	(a) 80,255	66,442 (c) 3,197	13,813	..
F.—Wages, &c., of Men, and hire of Teams	268,522	267,970 (d) 3,197	..	2,645
G.—Wages, &c., of Police Force . .	13,681	14,412	..	731
H.—Contingencies	1,300	1,200	100	..
£	2,696,815	2,524,815 (b) 11,000	164,376	3,376
Deduct,—				
I.—Appropriations in Aid	12,815	12,815	..	..
£	2,684,000	2,512,000 (b) 11,000	164,376	3,376
		Net Increase .	£161,000 (e)	

(a) These amounts include the sums of £27,580 and £8,554 for pay of Inspectors of Trades at Home and Inspectors of Shipwrights Abroad respectively, which is charged direct to the cost of shipbuilding.
(b) Additional Estimate, 13th July 1900. (c) Provided under Sub-head F. in 1900–1901.
(d) Transferred to Sub-head E. in 1901–1902.
(e) This Vote is decreased by a transfer of £50,000 to Vote 8, Section II. The real increase is therefore £211,000.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

Section 1	£1,005,700
„ 2	1,907,720
„ 3	6,089,836
	£9,003,256

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

	ESTIMATES. 1901–1902.	ESTIMATES. 1900–1901.	Increase.	Decrease.
	£	£	£	£
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores.				
A.—Timber, Masts, Deals, &c.	145,000	136,000	9,000	..
B.—Metals and Metal Articles	2,426,000	2,043,000 (a) 39,000	344,000	..
C.—Coals for Yard purposes	126,000	79,500	46,500	..
D.—Hemp, Canvas, &c.	225,000	191,500	33,500	..
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles	584,500	500,000 (a) 2,000	82,500	..
F.—Electrical, Torpedo, and other Apparatus	235,000	190,000 (a) 14,100	30,900	..
G.—Freight	69,000	60,000	9,000	..
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad	35,785	33,900	1,885	..
I.—Gas, &c., Dockyards at Home, and Naval Yards Abroad	15,215	14,100	1,115	..
Coals for the Fleet.				
K.—Coals, &c., for the Fleet	1,620,000	1,000,000	620,000	..
£	5,481,500	4,248,000 (a) 55,100	1,178,400	..
Deduct,—				
L.—Appropriations in Aid	175,000	164,000	11,000	..
£	5,306,500	4,084,000 (a) 55,100	1,167,400	..
		Net Increase	£1,167,400 (b)	

(a) Additional Estimate, 13th July 1900.
(b) This Vote is increased by a transfer of £50,000 from Vote 8, Section I., and £42,000 from Vote 8, Section III. The real increase is therefore £1,075,400.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

——	ESTIMATES. 1901–1902.	ESTIMATES. 1900–1901.	Increase.	Decrease.
	£	£	£	£
SECTION III.—CONTRACT WORK.				
A.—Propelling Machinery for His Majesty's Ships and Vessels	2,367,236	1,999,130 (*a*) 201,460	166,646	..
B.—Auxiliary Machinery for His Majesty's Ships and Vessels	89,568	69,059	20,509	..
C.—Hulls of Ships, &c., Building by Contract	3,187,230	3,381,961 (*a*) 90,470	..	285,201
D.—Purchase of Ships, Vessels, &c.	109,000	.. (*a*) 80,000	29,000	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	115,523	93,055	22,468	..
F.—Inspection of Contract Work	56,000	48,000	8,000	..
G.—Gun Mountings and Air-Compressing Machinery	611,050	612,650 (*a*) 38,070	..	39,670
H.—Machinery for His Majesty's Shore Establishments at Home and Abroad	215,000	100,000	115,000	..
I.—Royal Reserve of Merchant Cruisers	7,313	63,200	..	55,887
£	6,757,920	6,367,055 (*a*) 410,000	361,623	380,758
Deduct,—				
K.—Appropriations in Aid	72,420	38,055 (*b*) 35,000	34,365	..
£	6,685,500	6,329,000 (*a*) 410,000	327,258	380,758
	Net Decrease		£53,500 (*c*)	

(*a*) Additional Estimate, 13th July 1900.
(*b*) Provided under Vote 16 in 1900–1901.
(*c*) This Vote is decreased by a transfer of £42,000 to Vote 8, Section II., and £35,000 (Appropriation in Aid) from Vote 16. There is, therefore, a real increase of £23,500.

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET REPAIRS, MAINTENANCE, &c.,

SUB-HEADS under which this ESTIMATED EXPENDITURE will be provisions of Sec. 1 (2), ARMY

	ESTIMATED EXPENDITURE IN				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (A)	
	Personnel, Sec. I.	Matériel, Sec. II.			
	£	£	£	£	
NEW CONSTRUCTION:					
A.—DOCKYARD-BUILT SHIPS—					
Hulls, &c. (c)	832,310	(g) 1,787,590	256,740	2,876,640	1
Machinery	40,700	27,020	848,141	915,861	2
	873,010	**1,814,610**	**1,104,881**	**3,792,501**	3
B.—CONTRACT-BUILT SHIPS—					
Hulls, &c. (c)	125,640	88,860	(h) 3,511,166	3,725,666	4
Machinery	..	..	1,383,130	1,383,130	5
	125,640	**88,860**	**4,894,296**	**5,108,796**	6
C.—SMALL VESSELS (d) . .	7,050	4,250	90,659	101,959	7
TOTAL NEW CONSTRUCTION	**1,005,700**	**1,907,720**	**6,089,836**	**9,003,256** (f)	8
D.—RE-CONSTRUCTION, REPAIRS, ALTERATIONS, &c.	892,776	512,530	304,602	1,709,908	9
E.—SEA STORES, COALS, &c. .	..	807,000	18,391	825,391	10
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED .	..	..	..	..	11
TOTAL	**1,898,476**	**3,227,250**	**6,412,829**	**11,538,555**	12

(c) Including Hydraulic and Transferable Gun Mountings, &c.
(d) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.
(f) Exclusive of £37,300 provided under Vote 2 for new Tank Vessels and Lighters for Victualling Yard Service; also £22,433 provided under Vote 9 for new Vessels for Naval Ordnance Store Service, and £80,000 for Coaling Craft, Vote 8, Section 2, Sub-Head K.
(g) Including £1,224,000 for Armour.
(h) Including £1,018,000 for Armour.

VALUES OF STORES issued for SHIPBUILDING, RE-CONSTRUCTION, in the Year 1901–1902.

accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

1901–1902.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1900–1901.			Difference between Direct Expenditure, 1900–1901 (B) and 1901–1902 (A).	
Establishment, &c., Charges, apportioned.	Aggregate, 1901–1902.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1900–1901.	Increase.	Decrease.
£	£	£	£	£	£	£
300,289	3,176,929	(i) 2,678,822	269,791	2,948,613	197,818	..
25,856	941,717	743,573	22,320	765,893	172,288	..
326,145	**4,118,646**	**3,422,395**	**292,111**	**3,714,506**	**370,106**	..
92,916	3,818,582	(k) 3,768,455 (e) 103,690	78,829	3,950,974	..	146,479
22,113	1,405,243	1,168,803 (e) 201,460	17,529	1,387,792	12,867	..
115,029	**5,223,825**	**5,242,408**	**96,358**	**5,338,766**	..	**133,612**
1,741	103,700	100,493 (e) 80,000	1,736	182,229	..	78,534
442,915	**9,446,171**	**8,460,146** (e) 385,150	**390,205**	**9,235,501**	**157,960**	..
203,588	1,913,496	1,617,811 (e) 1,850	182,879	1,802,540	90,247	..
42,912	868,303	671,628 (e) 18,100 (l) 949,000	39,765 12,345	729,493 961,345	..	813,337
1,574,194	1,574,194	..	1,318,361 (e) 30,000	1,348,361	..	..
2,263,609	**13,802,164**	**12,103,685**	**1,973,555**	**14,077,240**		

NET DECREASE ON DIRECT EXPENDITURE . **£565,130.**

Estimated value of Coals to be issued to Ships in 1900–1901, provision for which service is excluded from the Programme for 1901–1902 . . **949,000.**

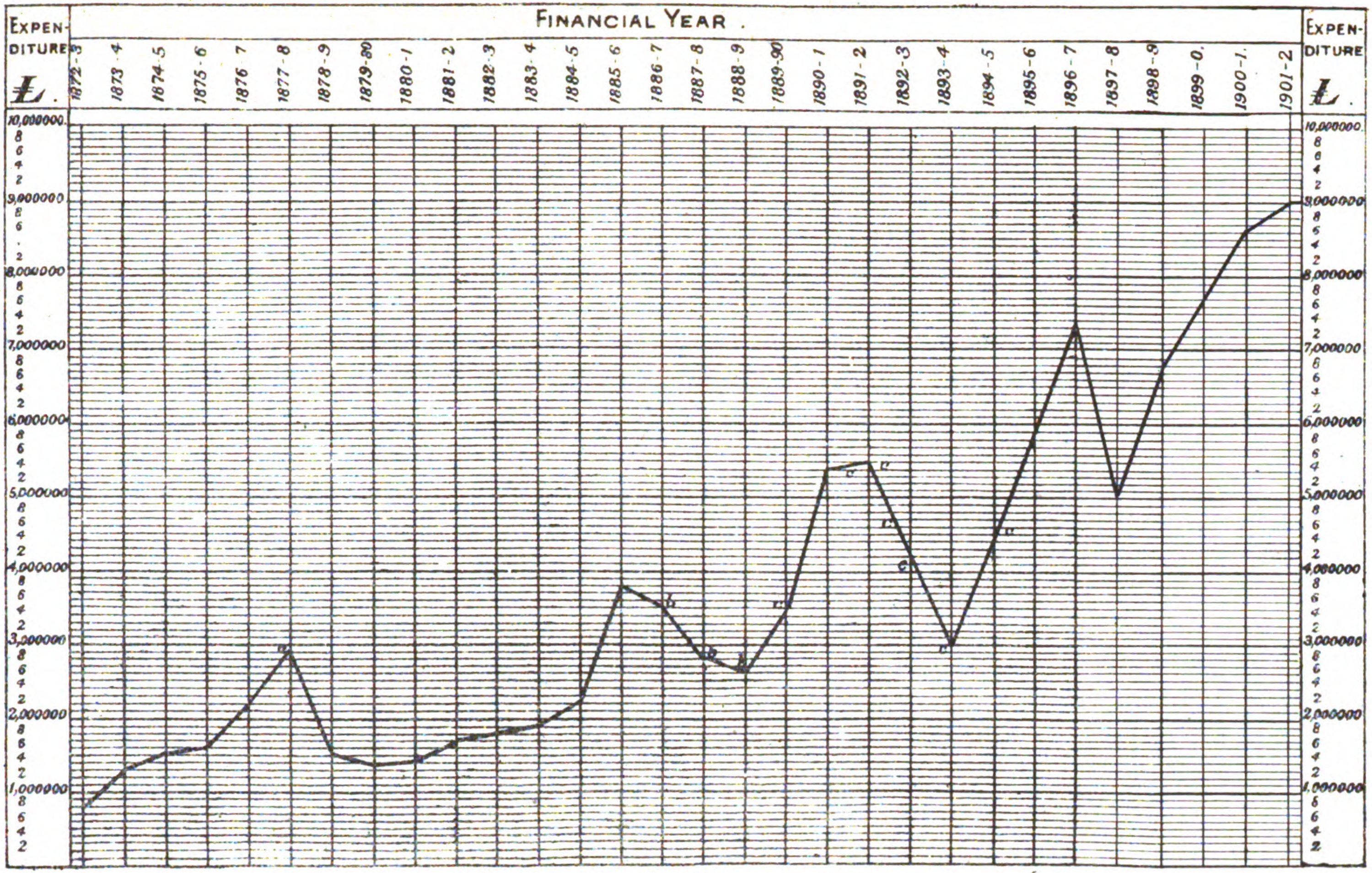
ACTUAL INCREASE . . . . **£383,870.**

(e) Additional estimate (Parliamentary paper dated 12th July 1900, No. 270).
(i) Including £1,003,536 for Armour.
(k) Including £1,211,274 for Armour.
(l) Value of coals for steaming purposes.

RECAPITULATION OF ESTIMATED EXPENDITURE.

	Estimated Expenditure.		Estimated Distribution of the Direct and Incidental Expenditure.							
			Naval Construction.					Establishment and Incidental Charges Unapportioned to Ships, &c.		
				Re-construction, Repairs, Alterations, and Refits.						
	Charged direct as Incurred. (a.)	Establishment and Incidental Charges Apportioned. (b.)	New Construction. (c.)	Ships Re-constructing. (d.)	Ships for Reliefs, or Re-commission. (e.)	Ships in Commission and Reserve. (f.)	Stores for Ships, &c. (g.)	Fleet, Port, National, and Unappropriated Charges. (h.)	Unappropriated Charges (Haulbowline, West India Docks and Naval Yards Abroad). (i.)	Total Amount of Estimated Expenditure. (k.)
SUB-HEADS OF EXPENDITURE.			A., B., and C.	D.			E.	F.		
	£	£	£	£	£	£	£	£	£	£
Section I.—Dockyard Work. Personnel	1,898,476	970,097	1,186,742	..	420,566	571,373	27,039	440,463	222,390	2,868,573
Section II.—Dockyard Work. Matériel	3,227,250	969,827	2,072 231	..	222,229	390,716	822,873	487,826	403,937	4,197,077
Section III.—Contract Work	6,412,829	323,685	6,187,198	..	133,552	175,060	18,391	19,578	..	6,736,514
TOTAL ESTIMATED EXPENDITURE for 1901-1902 £	11,538,555	2,263,609	9,446,171	..	776,347	1,137,149	868,303	947,867	626,327	13,802,164
TOTALS OF SUB-HEADS £	13,802,164		9,446,171	1,913,496			868,303	1,574,194		13,802,164

DIAGRAM SHEWING THE ACTUAL EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 30 YEARS BETWEEN 1872-73 & 1901-2.



Hanhart lith

(a.) Includes £1,523,000. for purchase of Ships under the Vote of Credit.
(b.) Includes Expenditure under Lord Northbrook's Special Programme
(c.) Includes Expenditure under the Defence Acts of 1888 and 1889.

LIST of NEW SHIPS and VESSELS Estimated to be Passed into the FLEET RESERVE during the Years 1901–1902 and 1900–1901.

1901–1902.				1900–1901.			
NAME OF SHIP.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.	NAME OF SHIP.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS.				**ARMOURED SHIPS.**			
Formidable . . .	15,000	15,000	16	Albion	12,950	13,500	16
Implacable . . .	15,000	15,000	16	Glory	12,950	13,500	16
Irresistible . . .	15,000	15,000	16				
Bulwark	15,000	15,000	16				
Vengeance . . .	12,950	13,500	16				
Aboukir	12,000	21,000	14				
Cressy	12,000	21,000	14				
Bacchante . . .	12,000	21,000	14				
Hogue.	12,000	21,000	14				
Sutlej	12,000	21,000	14				
PROTECTED SHIPS.				**PROTECTED SHIPS.**			
Spartiate	11,000	18,000	16	Pandora	2,200	*7,000	—
UNPROTECTED SHIPS.				**UNPROTECTED SHIPS.**			
Victoria and Albert .	4,700	11,000	—	Shearwater . . .	980	1,400	6
Assistance . . .	9,600	*4,200 (Howden's)	—	Vestal	980	1,400	6
Espiegle	1,070	1,400	6	Mutine	980	1,400	6
Fantome	1,070	1,400	6				
Rinaldo	980	1,400	6				
Teal	180	*800	—				
Moorhen	180	*800	—				
TORPEDO-BOAT DESTROYERS {18 No.}	various	various		TORPEDO-BOAT DESTROYERS {15 No.}	various	various	—
TORPEDO-BOATS {4 No.}	—	—	—				

* Forced draught.

French Navy Estimates, 1901.

Cap. in French Estimates.	Heads of Expenditure.	Credits voted for 1901.	Credits voted for 1900.
		£	£
	Personnel.		
1, 2	Admiralty Office	139,380	132,986
3, 4	Navy Pay	1,951,348	1,878,220
5	Marines	645,922	622,420
6	Gendarmerie Maritime	30,792	30,792
7	Inspection of Administrative Services	10,389	10,368
8	Construction Staff	231,336	195,440
9, 10, 11	Administrative Staff, Commissariat, etc.	273,440	268,491
12	Medical and Religious Staff	86,592	87,357
13	Fisheries and Navigation	28,052	26,872
	Labour.		
	Wages—		
14	Shipbuilding; new construction; fitting for sea	469,646	539,360
15	Shipbuilding; repairs	214,620	295,187
17	Armaments; construction of new guns	125,354	111,806
18	Armaments; repairs	67,600	26,582
19	Works	27,131	30,758
20	Victualling	33,969	33,545
16	Master-attendants' and Storekeepers' Departments	258,545	211,883
21	Hospitals and Miscellaneous	14,207	14,597
	Matériel.		
	Stores and Supplies—		
22	Admiralty	10,136	10,100
24	Shipbuilding in Dockyards	1,539,824	1,600,000
25, 26	Shipbuilding by contract	1,397,181	1,339,000
27, 28	Fitting for sea; maintenance; repairs	746,994	502,000
	Carried forward	£8,302,458	£7,967,714

Cap. in French Estimates.	Heads of Expenditure.	Credits voted for 1901.	Credits voted for 1900.
		£	£
	Brought forward - -	8,302,458	7,967,714
	MATÉRIEL—*continued.*		
	Stores and Supplies—*continued.*		
23	Hydrographic Service. . . .	20,944	22,544
29, 30	Repairs, conversions, etc., in dockyards and by contract	592,202	445,260
31, 32	Armaments; new guns and conversions; Powder, ammunition, repairs, tools, etc.	1,109,240	1,068,080
33, 34	Torpedoes	178,056	128,720
35	Works; new and large alterations. .	589,711	434,972
36	Ditto; deepening of the Charente .	19,966	..
37	Ditto, supplementary for defence of military ports	35,950	36,872
38, 39	Works; repairs	70,045	60,920
40	Clothing	220,140	212,160
41	Barracks	30,625	34,081
42, 43	Victualling.	1,015,536	960,117
44	Hospitals, etc.	107,959	107,959
*	Machinery, tools, etc.	..	212,732
45, 46	Fuel, lighting, office furniture, printing, etc.	55,145	55,216
	MISCELLANEOUS.		
47, 48	Travelling expenses, freight, allowance for lodgings, etc.	234,200	244,200
49	Charitable and subscriptions . . .	41,232	40,934
50	Fisheries and Commerce (materials for protection, etc.)	13,460	12,948
51	Pensions	466,828	453,788
52	Secret Service	4,000	4,000
53, 54, 55	Miscellaneous	..	4,444
	Total . . .	£13,107,697	£12,507,661

* Charges for machinery and tools are distributed among the various heads of expenditure in 1901 Estimates.

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1901.—BUILDING IN DOCKYARDS.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Expenditure proposed for 1901.
					£	£
Battleships	Henri IV.	Cherbourg	1897	1901	801,248	55,618
	Iéna	Brest	1898	1900	1,111,840	40,760
	Suffren	„	1899	1901	1,195,564	292,935
	A. 8.	„	..	1905	1,421,708	63,035
Armoured Cruisers, First-class	Jeanne d'Arc	Toulon	1896	1901	875,847	66,729
	Dupetit-Thouars	„	1899	1902	831,839	157,060
	Gueydon	Lorient	1898	1902	817,944	135,572
	Condé	„	..	1903	863,799	221,243
	Gloire	„	1899	1902	883,269	254,347
	La Marseillaise	Brest	1900	1902	881,270	288,500
	Jules Ferry (ex C. 11)	Cherbourg	..	1904	1,169,940	232,841
	Léon Gambetta (ex C. 12)	Brest	..	1903	1,169,940	252,536
	C 13 (Victor Hugo)	Toulon	..	1905	1,169,940	30,695
	Dupleix	Rochefort	1899	1902	652,354	80,972
	Jurien de la Gravière	Lorient	1897	1901	457,979	28,130
Torpedo-gunboats and Destroyers	Pertuisane	Rochefort	..	1901	68,907	42,589
	Escopette	„	..	„	68,907	43,591
	Flamberge	„	..	„	68,907	27,822
	Rapière	„	..	1902	68,907	27,613
	Carabine (ex M. 12)	„	..	„	68,907	20,630
	Sarbacane (ex M. 13)	„	..	„	68,907	20,609
	M. 22	„	..	1903	68,907	10,900
	M. 23	„	..	„	68,907	10,900
Aviso-transport	Vaucluse	„	1886	1901	81,256	18,386
Submarines	Algérien	Cherbourg	1899	1900	30,404	2,800
	Sirène	„	1900	1901	24,700	16,123
	Triton	„	„	„	24,700	15,723
			Carried Forward	.. .. £	15,016,297	2,458,659

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1901.—BUILDING IN DOCKYARDS—*continued.*

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Expenditure proposed for 1901.
					£	£
			Brought	forward .	15,016,297	2,458,659
Submarines continued .	Farfadet . . .	Rochefort	1900	1900	32,006	3,738
	Korrigan . . .	„	1900	1901	32,006	4,098
	Gnome . . .	„	..	1901	32,006	4,546
	Lutin	„	..	1901	32,006	6,226
	Silure (ex Q. 13)	Cherbourg	..	1902	24,700	19,001
	Espadon (ex Q. 14)	„	..	1902	24,700	18,681
	Q. 15 to Q. 22 eight boats*. .	Various .	..	1902–3	197,600	50,963
First-class Torpedo-boats .	Six First-class Torpedo-boats Nos. 223, 224, 225, 226, 244 and P. 96	Various .	..	1901–3	114,966	27,236
	Total Building in Dockyards in 1901.			£	15,506,287	2,593,148

* It has been decided to put in hand 20 submarine boats in 1901.—ED.

Programme of New Construction, to be continued or undertaken in 1901.—Building by Contract.

Class.	Names of Ships.	Places of Building and Completion.	Date of Contract.	Date of Completion	Total Estimated Cost.	Expenditure proposed for 1901.
					£	£
Battleship	A. 10.	..	..	1905	1,416,564	56,432
First-class Armoured Cruisers	Montcalm	La Seyne—Toulon	1897	1901	902,809	139,164
	Sully	" "	1899	1903	954,536	223,558
	Amiral Aube	St. Nazaire—Brest	"	"	973,440	293,850
	Desaix	" "	1897	1902	762,759	105,617
	Kléber	Bordeaux—Rochefort	"	"	770,320	121,090
Destroyers	Arquebuse	Le Havre—Cherbourg	1900	1903	73,103	36,731
	Arbalète	" "	"	"	73,103	36,414
	Mousquet	..	"	"	67,463	36,414
	Javeline	..	"	"	67,463	36,414
	Sagaie	..	"	"	67,463	36,414
	Epieu	..	"	"	67,463	36,730
	Harpon	..	"	"	67,463	36,730
	Fronde	..	"	"	67,463	36,730
	M. 24 to M. 31 eight boats	..	..	1903-4	539,704	88,400
Sea-going Torpedo Boats	Siroco	Le Havre—Cherbourg	1898	1900	42,598	3,960
	Mistral	" "	"	1901	42,598	4,080
	Simoun	" "	"	"	40,957	2,120
	Typhon	" "	"	"	40,957	5,880
	Trombe	Nantes—Lorient	"	1900	41,108	3,460
	Audacieux	" "	"	"	41,108	5,500
	Bourrasque	Le Havre—Cherbourg	1899	1901	40,317	19,332
	Rafale	" "	"	"	40,317	24,012
	Borée	Bordeaux—Rochefort	"	"	39,636	19,006
	Tramontane	" "	"	"	39,636	15,807
First-class Torpedo Boats	31 First-class Torpedo Boats	Le Havre—Cher.: 6 Chalon—Toulon: 9 Bord.—Rochf.: 5 .. 11	Various	5 in 1900 8 in 1901 14 in 1902 4 in 1903	567,807	177,562
Torpedo Scout	Libellule	Cherbourg	1899	1900	13,754	1,218
		Total Building by Contract in 1901			£7,861,909	1,552,125

German Navy Estimates, 1901.

(*Converted at £1 = 20·43 marks.*)

Ordinary Permanent Estimates.

—	Proposed for the financial year 1901.	Granted for the financial year 1900.
	£	£
Imperial Naval Office	72,590	63,743
Observatories	15,614	15,651
Accounts	17,553	16,222
Martial Law	5,266	3,486
Divine Service and Schools	4,121	3,909
Military Personnel	878,132	808,986
Maintenance of the Fleet	935,558	845,462
Victualling	57,450	54,932
Clothing	15,653	15,144
Barrack Administration, Cashiers and Accountants	121,920	114,602
Lodging Allowance	66,525	62,024
Medical	65,416	58,571
Travelling Expenses, Freight Charges, &c.	121,644	121,644
Training Establishments	15,486	14,515
Dockyard Expenses	1,058,343	1,000,249
Ordnance and Fortification	355,776	324,702
Accountant-General's Department	27,086	24,563
Pilotage and Surveying Services	25,696	25,257
Miscellaneous Expenses	48,562	41,745
Administration of Kiau-chau Protectorate	2,355	1,898
Total . . . . . £	3,910,746	3,617,305

Special Ordinary Estimates.

Shipbuilding Programme for the Financial Year, 1901.

For the Construction of—

	£
Battleship Kaiser Barbarossa (A), 4th and final instalment	134,606
„ Kaiser Karl der Grosse (B), 4th and final instalment	100,734
Large cruiser Prinz Heinrich (A), 4th and final instalment	165,198
Battleship Wittelsbach (C), 3rd instalment	176,211
„ D, 3rd instalment	293,685
„ E, „	293,685
Small cruiser Thetis (C), 3rd and final instalment	55,800
„ Ariadne (D), „ „	55,800
Battleship F, 2nd instalment	318,160
„ G, „	318,160
Large cruiser B, „	293,685
Small cruiser E, 2nd and final instalment	129,222
„ Amazone (F), 2nd and final instalment	129,222
Gunboat A, 2nd and final instalment	48,946
Battleship H, 1st instalment	146,842
„ J, „	146,842
Large cruiser Ersatz König Wilhelm, 1st instalment	166,422
Small cruiser G, 1st instalment	63,632
„ H, „	63,632
„ J, „	63,632
Alteration of vessels of Siegfried class, 1st instalment	220,264
One Torpedo-boat Division, 2nd and final instalment	168,380
„ „ 1st instalment	117,474
Total	£3,670,234

Summary.

—	Proposed for the financial year 1901.	Granted for the financial year 1900.
	£	£
Ordinary Permanent Estimates	3,910,746	3,617,305
Shipbuilding	3,670,234	2,395,203
Armaments and Torpedo Equipments	1,253,206	1,008,370
Other Items	306,008	185,218
Extraordinary Expenditure	489,476	270,191
Total £	9,629,670	7,476,287

Italian Navy Estimates, 1901-1902.

FINANCIAL YEAR, 1ST JULY, 1901, TO 30TH JUNE, 1902.

Converted at £1 = 27 lire.

——	Proposed for 1901-1902.	Revised Estimates 1900-1901.
ORDINARY EXPENDITURE—GENERAL EXPENSES.	£	£
Admiralty	48,883	49,338
Pensions	200,926	190,963
Expenditure on various services connected with the Mercantile Marine	427,431	527,250
Total . . £	677,240	767,551
EXPENDITURE FOR NAVAL SERVICES.		
Ships fitting out	225,148	220,670
General Staff of the Navy	127,111	120,119
Corps of Constructors	49,629	49,074
Commissariat Service	33,259	33,333
Medical Service	24,867	24,867
Wages—Men	462,963	444,444
Gratuities	62,618	55,619
Assistants to Constructors and others	53,681	53,348
Accountants, &c.	53,520	53,518
Police	11,326	11,326
Telegraph Service	9,259	6,666
Telegraph Materials	5,925	8,518
Forts—*Personnel*	12,037	11,111
Victualling	300,000	290,370
Lighting	7,704	7,333
Hospital Services	17,828	17,828
Honorary Distinctions	444	444
Fuel and Stores	266,666	205,255
Salaries and Wages—Workshops and Fortifications	4,130	4,130
Training Establishments	15,111	15,555
Naval Academy	5,536	5,431
Scientific Services—*Personnel*	1,374	1,419
„ „ *Matériel*	9,444	9,259
Law Charges	1,185	1,185
Travelling Expenses	18,518	18,518
Transport of Materials	4,629	4,629
Carried forward . . . . £	1,783,912	1,673,969

—	Proposed for 1901–1902.	Revised Estimates. 1900–1901.
	£	£
Brought forward	1,783,912	1,673,969
Materials and Labour for repairs of Ships	487,034	668,518
Guns, Torpedoes and Small Arms	262,963	81,481
Labour for construction and repairs of Armaments	82,334	82,334
Works Department—Repairs	87,171	87,171
Construction and Completion of the following Vessels, viz.: 1st Class Battleships: Benedetto Brin, at Castellamare; Regina Margherita, at Spezia; Armoured Cruiser: Francesco Ferrucio, at Venice; Torpedo-boat Destroyers; Small Craft; Laying down of a 1st class Battleship; Alteration of the Italia	888,888	888,888
Total £	3,592,302	3,482,361

EXTRAORDINARY EXPENDITURE.

	£	£
General Expenses and Half Pay	2,760	2,832
Shipbuilding	14,814	18,518
Coast Defence and Fortifications	14,814	14,812
Torpedoes	18,518	18,518
Total £	50,906	54,680

SUMMARY.

	£	£
Ordinary Expenditure—General Expenses	677,240	767,551
Expenditure for Naval Services	3,592,302	3,482,361
Extraordinary Expenditure	50,906	54,680
Depreciation of Ships in Commission	129,629	129,629
Rent of Lands occupied by Government	98,671	98,532
Grand Total £	4,548,748	4,532,753

Russian Navy Estimates, 1901.

(*Converted at £1 = 9·6 Roubles*)

Heads of Expenditure.	1901.	1900.
	£	£
Central and Ports Administration	244,690	237,014
Salaries and Assistance	56,800	52,744
Educational	118,000	102,469
Medical Establishments and Services	125,393	108,885
Pay of Officers, Seamen, etc.	561,723	494,941
Victualling	196,955	183,441
Clothing	300,195	246,631
Expenses of Ships in Commission	2,116,542	1,489,351
Hydrographic Department	104,959	83,867
Hydrographic Survey of the Mouths of the Yenesei and Obi	5,698	5,698
Naval Armaments and Electric Lighting	1,246,365	905,837
New Construction	1,854,733	2,402,128
Repairs and Refits	812,258	652,801
Admiralty Yards and Workshops	606,528	488,463
Buildings, Rent and Repairs	589,000	421,825
Building and Maintenance of Lighthouses	31,250	28,646
Various Expenses	258,087	231,878
Works of Port Alexander III.	333,333	333,333
Improvement of Vladivostock	208,333	312,500
Improvement and Fortification of Port Arthur	312,500	312,500
Expenditure on account of Next Year's Estimates	31,006	26,369
Total £	10,114,348	9,121,321

United States Navy Estimates, 1901 and 1902.

(*Converted at £1 = $4·8665, Par, as adopted by Congress*).

Detailed objects of Expenditure and Appropriation.	Estimates, 1901.	Appropriations, 1901.	Estimates, 1902.
	£	£	£
Pay of the Navy . . .	2,631,315	2,632,466	3,108,122
Pay, Miscellaneous . . .	102,743	102,743	123,292
Contingent, Navy . . .	2,055	4,109	2,055
Emergency Fund . . .	..	61,646	102,743
Bureau of Navigation . .	93,366	117,378	144,194
„ Ordnance . . .	514,357	490,727	534,563
„ Equipment. . .	666,285	711,816	917,456
„ Yards and Docks .	109,590	125,026	135,994
Public Works—			
Yards and Docks . .	2,829,233	1,665,646	2,528,005
Naval Observatory . .	6,267	2,569	5,754
Bureau of Navigation, including Naval Academy Buildings . . .	415,288	71,920	640,382
Bureau of Ordnance . .	..	..	175,978
Bureau of Medicine and Surgery.	36,987	45,207	42,124
„ Supplies and Accounts	661,755	561,230	921,370
„ Construction and Repairs	1,293,706	1,281,377	1,658,445
„ Steam Engineering .	570,000	570,081	775,280
Naval Academy . . .	42,703	40,045	45,119
Marine Corps	554,890	557,458	599,717
Increase of Navy . . .	4,722,718	4,344,128	5,378,180
Total . . .	£15,253,318	£13,385,572	£17,838,773

INDEX.

D.

E.

F.

G.

H.

I.

J.

K.

L.

M.

N.

O.

P.

T.

U.

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